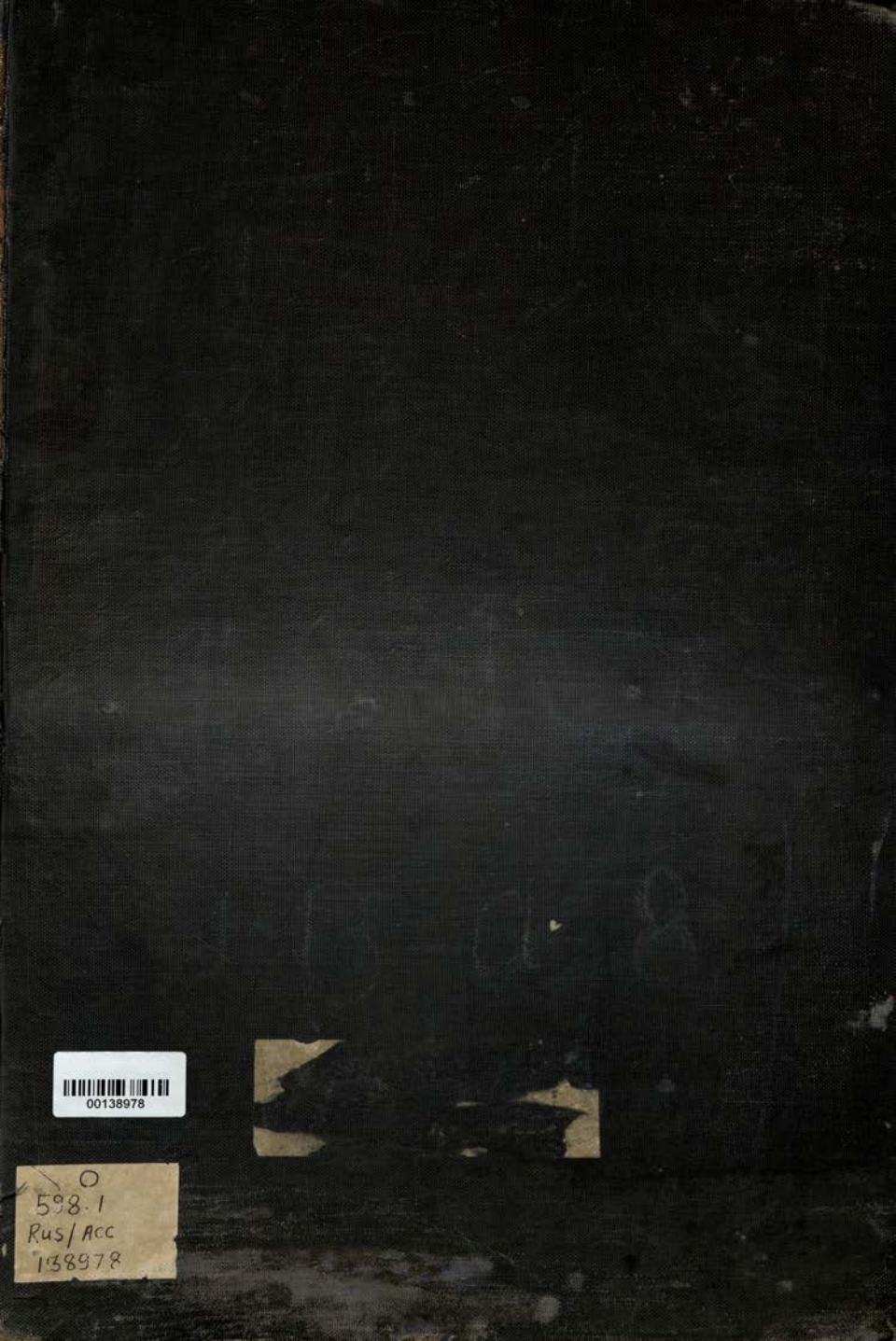
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AN

ACCOUNT

OF

INDIAN SERPENTS,

COLLECTED ON THE

COAST OF COROMANDEL;

CONTAINING

DESCRIPTIONS AND DRAWINGS

OF EACH SPECIES;

TOGETHER WITH

EXPERIMENTS AND REMARKS

ON THEIR SEVERAL POISONS.

BY

PATRICK RUSSELL, M. D. F. R. S.

PRESENTED TO

THE HON. THE COURT OF DIRECTORS OF THE EAST INDIA COMPANY,

AND PUBLISHED BY THEIR ORDER, UNDER THE SUPERINTENDENCE OF THE AUTHOR.

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1796.

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TO

THE HON. THE COURT OF DIRECTORS

OF THE

EAST INDIA COMPANY,

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THE FOLLOWING WORK,

INTENDED PRINCIPALLY FOR THE USE AND BENEFIT OF

THE COMPANY'S ESTABLISHMENTS IN INDIA,

IS RESPECTFULLY INSCRIBED, BY THEIR

MOST OBEDIENT, AND

MOST HUMBLE SERVANT,

PATRICK RUSSELL.

PREFACE.

Few branches of the Natural History of the East Indies, have been less cultivated in the Company's establishments abroad, than that of Serpents. It must be acknowledged, that it offers no attractive allurements; and that those who, from other avocations, can only spare transient attention to subjects of Natural History, are more likely to prefer objects less disgusting, and experiments accompanied with less cruelty, and personal danger. Even the eager and resolute Naturalist has to contend with many difficulties in this path of research. He cannot, at once, divest himself of the abhorrence, next to innate, of these reptiles; nor can he soon acquire a dexterity in handling them, with that calmness requisite for his own safety. The search for plants, for birds, or even insects, is comparatively pastime, or pleasurable occupation; but in the actual pursuit of the disgusting race of serpents, he stands in need of assistants who are not, at all times, to be procured; and if he relies solely on the diligence of such as he may employ, he will find himself exposed to the chagrin of incessant disappointment. Nor is this all: to a stranger not acquainted with the languages of Hindostan, the difficulty of obtaining local information, is often increased by the stupidity of menial interpreters; the curiosity, at the same time, of the Gentoos, extends little beyond the limits of their ordinary concerns; they are naturally credulous; and have a strong propensity to the marvellous.

That less ardent, or mere casual curiosity, should have been damped amid so many discouragements, will not appear surprising; nor that their influence should have extended even to the province of the medical gentlemen abroad, to which researches into physiology more peculiarly belong. The effect of such influence, however, will hardly be doubted, when, after the opportunities of observation in a course of two Centuries, the medical history of symptoms consequent to the bite of serpents, remains in a state not less defective, than the natural history of the reptiles themselves.

Yet, it is not to be supposed that a subject of such interesting importance in that country, has been altogether neglected. There are many of the gentlemen long resident abroad, who recollect (however imperfectly,) circumstances attending accidents, which happened within their own knowledge; and I heard, when in India, of several who had formerly dedicated some leisure hours to experiments on serpents. But it is to be lamented that the scattered information has never been collected; and that the result of experiments, together with accidental discoveries, have not been recorded in a manner to preserve them for the benefit of posterity.

When allowance is made for those who return to their native country, and for those who find their graves in India, the European inhabitants of the British settlements may be said to undergo a total change once in twenty-five years: that is, very few, at the termination of such a period, shall be found remaining in the country, who lived in it at the beginning. The change, it is true, though completed periodically, is produced gradually; and other sorts of knowledge, as well as commercial, may be maintained by oral communication: but Natural History is, at best, very imperfectly transmitted by tradition. What finds its way from one era to another, usually arrives encumbered with accumulated errors; while corrections, or discoveries, if not committed to writing, perish with the individuals by whom they were made: hence each era has, as it were, to set out anew, deriving little, if any, advantage from the experience of preceding times.

This, and similar considerations, first suggested the idea of collecting and describing the serpents found on the coast of Coromandel.

The terror occasioned by those numerous reptiles, is immoderately aggravated by the indiscriminate apprehension of all being poisonous. To distinguish, therefore, those that are really so, from such (by far the greater number,) as are harmless, becomes a matter next in importance to the discovery of a remedy against their poison.

When it is determined whether the reptile be poisonous or innocuous, the next requisite is, that it should be so defined, as to obviate the chance of being confounded with any other species, under whatsoever name that species may be known in different places; and the most

likely mode of effecting this, is by accurate drawings and descriptions, taken from living, or from recent subjects.

The identity of the species being properly ascertained, it naturally follows to make trials on various animals, in order to discover the effect of its bite. Experiments of this kind chiefly respect poisonous serpents; though they ought not to be confined to such only: mischievous qualities are, by the natives, imputed to snakes, which anatomical inspection demonstrates to be not furnished with a poisonous apparatus; yet the imputation had better be opposed by experiment, than by theoretical reasoning, however specious. The poisonous serpents, nevertheless, are the principal subjects of experiment, as from the effects of their poison on brutes, probable conjectures may be formed concerning their effects on the human species; and it is also probable that the same remedies may be nearly of equal service to both. But an object, of all others the most important, was to collect a medical account of the disease, arising from the poison of serpents, as it appears in the human subject; and of the most effectual remedies employed in the cure.

The successful prosecution of a scheme in its nature so extensive, required more than the exertions of a private individual. Information was to be solicited from those to whom I was a stranger; for I had the honour to be known to a few only of the gentlemen resident at the different settlements. It was therefore judged advisable, in the first instance, to communicate the design to the Governor of Madras. This being accordingly done in an explanatory Memoir, the design met with entire approbation; the Memoir was ordered to be printed, and, together with the recommendation of the Board, to be transmitted to the several subordinate settlements.

It is but justice, on this occasion, to acknowledge, that the willingness to lend assistance, expressed in return from all quarters, proved a powerful incitement to prosecute my design; while specimens received from different parts, enriched my collection with some that were unknown in the Vizagapatam district.

As to accurate information concerning the morbid appearances consequent to the bite of serpents, as well as regarding the manifest effects of remedies, what it was in my power to glean, fell far short of expectation; and showed clearly, that little improvement in either respect was to be looked for, until these reptiles were better distinguished, and more universally known. Nor is it to be wondered, if imperfect descriptions, and the vague application of vulgar names, should occasion frequent mistakes. A harmless snake is often supposed to be one highly noxious; the person bitten is tortured by imaginary terrors; and frivolous remedies, gaining credit for cures, where no malady existed, are unhappily relied on in cases of real danger. It may further be remarked, that unless the usual course of the disease be ascertained, from close and extensive observation, the effects of medicines are in perpetual hazard of being confounded with the morbid symptoms in their natural progression; the degree of danger indicated by any combination of symptoms must remain doubtful; and, consequently, the merit of remedies can never be justly estimated.

The present work contains Descriptions of Forty-three Serpents, illustrated with coloured Engravings.—Experiments on the effects of their bites;—Experiments on several remedies;—Miscellaneous Experiments and Remarks; with a few Observations on the apparatus provided by Nature for preparing and instilling the poisons. The experiments are distributed in eight Sections, under their respective titles. The descriptions being calculated less for the professed naturalist, than for the service of gentlemen in India, not conversant in such matters, a few preliminary explanations will not be deemed impertinent.

Serpents, according to the Linnæan arrangement, are placed in the second order of amphibious animals; but of the six genera of which that class consists, three only are to be found in the present collection, viz. the Boa, Coluber, and Anguis.

The Boa is distinguished by scuta on the under part of the tail, as well as on the belly; that

is, by sub-caudal and abdominal scuta. The Coluber, like the Boa, is furnished with abdominal scuta; but on the under part of the tail, instead of scuta, it has sub-caudal squamæ, which resemble scuta divided in the middle, and, in reckoning their number, are counted by pairs. In distinction to ordinary scales, the sub-caudal squamæ have, by some, not unaptly, been termed scutellæ. The Anguis has neither scuta nor scutellæ; being, in general, covered universally with uniform scales.

These three genera are readily distinguished by their respective characters; but many different serpents are so exactly alike in their shape and form, that it is very difficult to define the specific differences with tolerable precision.

I have, throughout the descriptions, adhered to the usual practice of counting the scuta and squamæ separately, as well as jointly; though not unaware how considerably the number varies in subjects of the same species: in the Cobra de Capello, for example, the variation is found to be eighteen or twenty.

The shape of the head; the shape and site of the eyes and nostrils; the form and dimensions of the trunk and the tail; the size, form, and arrangement of the scales; have all been particularly mentioned in the descriptions, though in a number of different species, very little, if any, variation is observable.

The number of laminæ of the head, in the species, is constantly the same, and the variation in shape not considerable; but the number, as well as shape, are so exactly the same in many different species, as renders both, at best, only vague marks of distinction.

Colour, spots, bands, and fillets, in living, or recent subjects, appear to be distinctive marks the least subject to variation. The difficulty, however, of describing these precisely, in words, leaves it always desirable to have coloured drawings from the living reptile: for it should be remarked, that the colours of snakes (though not so rapidly as in fish) are very apt to fade soon after death, and in time to suffer great change from the spirits employed for the preservation of specimens.

The poisonous serpents are sufficiently distinguished by their fangs; which, in the living animal, when held properly by the neck, or irritated, are readily enough discerned; though not always so easily, in their recumbent state, or in the dead subject. But the want of a row of teeth in the upper jaw, found in that of all harmless serpents, serves also as a criterion, even where the fangs have purposely been eradicated, or lost by accident.

The ordinary teeth, or holders, common to all serpents, are nearly of the same shape; curve, reflex, and sharp: but they vary in size and number, in different species.

In serpents not venomous, there are three rows of common teeth in the upper jaw; one exterior, and two interior: the former, I have, in the descriptions, termed marginal; the latter, though in reality fixed in the jaw bone, I have, from their apparent situation in the undissected head, termed palatal.

The palatal teeth, in a venomous serpent, are exhibited in the anatomical Plate XLV.; where the space occupied by the marginal row in the jaw of a harmless serpent, appears to be filled up by the poisonous fangs, and the sacs which envelop them.

As the marginal row is invariably found in serpents not venomous, and the palatal rows are found in all serpents whatever, the constant repetition in the descriptions, respecting the teeth, might have been obviated by a general remark. But the subjects were examined at different times, while I was ignorant that poisonous serpents had no marginal row: for it was not till after my return from India, that I had the pleasure of finding the result, on a comparison with my own descriptions, accord exactly with the discovery communicated to the Royal Society in 1788, by Dr Gray, who had examined above one hundred and fifty specimens of serpents in the British Museum. The only exception I have met with to the general rule, was in a poisonous Boa, in which three ordinary teeth are found placed singularly in the upper jaw: and this anomaly, as it prevented my making alteration in transcribing my own original descriptions, has led me to wish that the common teeth should be particularly attended to, in the future examination of Indian serpents.

In regard to the experiments, little need be added in way of preface, to what will be found in the respective Sections.

The sixth Section contains some experiments on caustics, and other remedies applied to brutes: as also an account of an Indian remedy, in high credit in the Carnatic. Mention is made likewise of remedies, in which, not having tried them myself, I have done little more than refer to the authors by whom they have been recommended.

The seventh Section treats of the effects of poisonous bites on the human species. Qualified, on this head, to offer very little from my own experience, it would have been satisfactory to have had it in my power to collect more from the experience of others. The few cases I have produced, and for which I am indebted to friends, will, I trust, be deemed valuable; and it is hoped may prove an inducement to future communications. A complete medical description of the disease, in the human body, consequent to the bite of serpents, is a long lamented desideratum in physic, which gentlemen in India have it much in their power to assist in supplying. What I have, in this Section, taken the liberty of suggesting on the subject, to the Faculty in that country, I am persuaded runs no risk of being construed, in any degree, as presuming to dictate.

The eighth Section contains miscellaneous experiments on serpents; together with some remarks on their poisonous organs. But a more scientific description of these organs, is reserved for the Explanation of the Anatomical Plates, by Mr. Everard Home, to whose friendship I am indebted for the dissection (in a manner I was unequal to) of several snakes' heads, brought on purpose from India; and who enhanced the obligation, by taking upon himself the care of correcting the drawings, as well as the engravings of both Plates.

From the Prospectus now given of the present publication, it will appear, that a part only of the projected design has been executed. It would have been very flattering to the Author, to have had it in his power to offer the work in a more complete state; yet, as a first essay towards the improvement of a branch of Zoology, peculiarly interesting to the country where the experiments were made, he flatters himself that, so far as he has been able to execute, will be received with indulgence. Errors, whether in the construction of the plan, or in the mode hitherto of conducting it, will admit of correction in future; for he indulges the hope, that the plan will not only continue to be prosecuted on the coast of Coromandel, but, in time, will be so extended as to comprehend the entire tribe of Indian serpents.

Arrived at an age which admits only of a faint prospect of living to see his wish fulfilled, the Author still retains sufficient vigour of mind, not to despair of its future accomplishment. The universal inclination to contribute assistance which he experienced abroad, he regards as a strong ground of confidence; the propitious disposition of the Direction at home, as a still stronger. For not to mention instances of prior date, in respect to History, Geography, Astronomy, and Philology, the present Work is the second on Natural History, which, within these eighteen months, owes its public appearance to the liberality of the Court of Directors: and there is no reason to doubt the continuation of the same favourable disposition.

In the mean time, while a prosperous state of the Company's affairs, ensures the national respect for the administration by which their commercial concerns have been so successfully conducted; the Literary world will pay its tribute of gratitude for the attention spared to the concerns of Science. A certain prospect of meeting with approbation at home, must naturally conduce to invigorate that active spirit for research, already disseminated in the Company's territories; and it is to be hoped, that the Asiatic Society of Bengal, though lately depressed by the irreparable loss of its much lamented founder, will persist in emulating the example he set, of indefatigable application to a variety of liberal pursuits, for the instruction of the Western world: all circumstances conspiring, by a fortunate combination, to distinguish the latter half of the eighteenth Century, as a splendid era in the annals of the East India Company.

April 2d, 1796.

MEMOIR

OF

THE LIFE AND WRITINGS

OF

PATRICK RUSSELL,

M. D. F. R. S.

DR. RUSSELL having died while the publication of his Account of Indian Serpents was going forward, the following short Account of his Life has, in compliance with the wishes of some of his intimate friends, been drawn up from the most authentic sources, to accompany the last fasciculus of that work.

Dr. Patrick Russell was a younger son of John Russell, Esq.* of Braidshaw in Mid Lothian, a writer to the Signet, by his third wife, Mary, daughter of the Reverend Mr. Anderson, minister at West Calder. He was born at Edinburgh on the 6th of February, 1726 (O. S.). He received the rudiments of his classical education at the High School of that city; and he studied at the University there several years.*

* Dr. Fothergill, in an "Essay on the Character of the late Alexander Russell, M. D. of which a few copies were printed in London in 1770, and subjoined to a collection of his works, Lond. 1782, mentions that Mr. John Russell, his father, was a person of great eminence as a lawyer in the city of Edinburgh, and singularly happy in having seven of his sons, that lived to be men, not one of whom, by misbehaving, ever gave him cause of a moment's disquietude; but, on the contrary, by the just reputation they acquired, made all good men rejoice that he had such a family, and so eminently distinguished by so many good qualities." In a note upon this passage, written by Mr. William Russell, it is added, that "so judicious was the plan of education adopted by Mr. John Russell, that in bringing up a large family of boys, he never, even *in one instance*, found it necessary *to inflict a punishment, or even to* use a harsh expression. He was never seen to be angry. He lived to the advanced age of eighty-six, retaining his cheerfulness and faculties to the last."

All the children of the first marriage died in infancy; their mother died in 1705; and of nine, the issue by the second wife, three only arrived at manhood: I. *John*, of Roseburn, writer to the Signet, F. R. S. Edin. (one of the original members and founders of that society. See Prof. Dug Stewart's Life of Robertson), author of "the Forms of Process in the Court of Session and Court of Teinds," Edinb. 1768; and of "the Theory of Conveyancing," Edin. 1788.— II. *William*, secretary to the Levant Company, F. R. S. Treasurer to the R. S. (Mulgrave's Voyage to the North Pole, p. 97. Bruce's Travels, Introd. pp. vii. lix. lxii.) and III. *Alexander*, M. D. F. R. S. (Lettsom's Memoirs of Fothergill. Fothergill's "Essay on the Character of Alexander Russell," 4to. 1770.), author of the Natural History of Aleppo, 4to. 1756.

The seven children of the third marriage were all sons. The eldest of those who reached manhood were, IV. *David*, solicitor and accomptant in Edinburgh. V. *Patrick*, the subject of this Memoir. VI. *Claud*, chief at Vizagapatam, in the Honourable East India Company Civil-Service (Dalrymple's Oriental Repertory, Vol. I. pp. 49. 96, 255.). And VII. *Balfour*, M. D. who was appointed physician to the factory of Algiers, but died before he could reach his destination.

Dr. Alexander Russell, an elder brother, had been for a considerable time in Turkey, as physician to the English factory at Aleppo. Dr. Patrick joined him there in 1750, and lived with him for several years. During this time, he applied himself with great diligence, and with remarkable success, to the acquisition of the different languages of Syria.

In 1755 Dr. Alexander Russell left Aleppo on his return to Britain, and his brother Patrick succeeded him as physician to the British factory.

In this situation, Dr. Patrick Russell's affable and engaging disposition soon rendered him as much beloved as his predecessor had been. It endeared him not less to the Turks, than to the resident Europeans. His medical attentions were equally as conspicuous to the natives of all ranks, as to the gentlemen belonging to the English factory. Such was the esteem he was held in by the Bashaw of Aleppo, that he was honoured with the privilege of wearing a turban; there considered as a signal mark of distinction to an European, and one which is seldom conferred.

Although his professional labours occupied much of his time, and were attended, in that climate, with great personal fatigue, his ardent attachment to the study of natural history incited him to snatch every opportunity for such investigations. He occasionally transmitted communications on their results to his friends in Britain,

Dr. Alexander having, in 1756, published his Natural History of Aleppo, sent a copy to his successor, with an earnest request that he would collect and send home additional information. To Dr. Patrick's own predilection for such studies, was thus superadded the powerful motive of gratifying a brother, to whom he was bound by ties of esteem and gratitude, as well as affection. For many years, therefore, did he continue regularly to correspond with his brother on scientific subjects connected with the history of Syria, and to collect and transmit authentic information on a great variety of topics, in the view of correcting and enlarging a second edition of the Natural History of Aleppo.

In 1759 several remarkable shocks of an earthquake occurred in Syria. Of the phenomena attending these, and of their consequences, Dr. Russell gave a particular account in letters to his brother Alexander. These letters were published in the Philosophical Transactions for 1760.*

Aleppo, it is well known, is liable to that calamitous epidemic, the *plague*. When the first symptoms of that scourge of human nature at any time appeared, far from shutting himself up, as was customary with Europeans, Dr. Russell remained calm and collected, and displayed a steady perseverance in the discharge of his duty, which could result only from the guidance of a beneficent, courageous, and well regulated mind. After communicating to the English Consul instructions in writing for the observance of those attached to the English factory, he used to take leave of all his friends, who, at his express desire, shut themselves up within the limits of the factory, and did not suffer the least intercourse to be had with them. At the most imminent risk did Dr. Russell then apply himself to the treatment of the diseased. If he was not able to arrest the progress of the malady, he had thus at least the best opportunities of investigating its nature, watching its symptoms, and trying the effects of various powerful medicines, and different modes of treatment. The correct and extensive information which he acquired by experience in this most hazardous manner, during several successive visitations of the plague in 1760, 61, and 62, qualified him in a peculiar manner for writing a history of that direful distemper; an advantage of which he happily survived long afterwards to avail himself.

* Vol. LI. Part II. p. 529.

After a residence of about twenty years at Aleppo, he resolved to revisit his native country. He travelled chiefly over land; and he rendered his journey through Italy and France interesting and useful, not only to himself, but eventually to his countrymen, by minutely examining all the principal lazarettos in those countries, and inquiring into their regulations, and general management. The proper care of the sick in all public hospitals was always a subject he had much at heart.

Soon after his return to England in 1772, he went to Edinburgh, where he remained some time, having views of settling as a physician in that city. Afterwards, however, by the advice of the late Dr. Fothergill, (who was always in habits of intimate friendship with him, as well as with his elder brother,) he removed to London, on account of the wider sphere it offered for professional exertion.

In London he remained till the latter end of the year 1781, when affection for his brother, Mr. Claud Russell, whose precarious state of health at that time required constant and particular attention, induced him to sacrifice his flattering prospects in the capital, and accompany his brother to the East Indies.

There he resided principally at Vizagapatam, his brother having been appointed to the highest office in that settlement. His time and attention were, in a great measure, devoted to the natural history of that country, which had been hitherto little explored. Dr. Koenig, indeed, (whom Dr. Russell met in June, 1782, at Tranquebar, on the Coast of Coromandel), had for some years been employed by the Honourable the East India Company in the botanical department: and Dr. Russell has, in a Preface which he wrote to the first fasciculus of Coromandel Plants, born ample testimony to the zeal and success of that botanist.* On Dr. Koenig's death at Jagrenatporum, in June, 1785, the Governor of Madras communicated to Dr. Russell, in very flattering terms, his wish that he should accept of the appointment of Botanist or Naturalist to the Company. Fortunately for science, the Doctor accepted the offer, through the persuasion of his brother, Mr. Claud Russell. This was in November, 1785. During the three following years Dr. Russell was indefatigable in his researches, turning to the best account the facilities afforded by his appointment, not confining his attention to the vegetable kingdom, but eagerly collecting, figuring, and describing the Fishes and the Serpents of the country.

In the botanical department, he began by submitting to the Governor of Madras an extensive plan for acquiring information concerning such plants of the country as are put to any economical use. He proposed that letters should issue from the highest authority, inviting the gentlemen, particularly of the medical department, resident at the different stations, to transmit every information in their power concerning such useful plants, accompanied with specimens of each plant, including the leaf, flower, and fruit, with a view to publication. This plan having met with the sanction both of the Madras Government and of the Medical Board, was immediately commenced.

It is well known that serpents are numerous in the East Indies, and that the bite of some species produces the most direful effects. With the humane view of enabling any one, though not a naturalist, to distinguish a poisonous from a harmless serpent, and thereby relieve the anxious doubts and fears of many who might happen to be bitten, he, in the end of the year 1787, drew up a distinct description of the peculiar organs to be observed in the mouth of a poisonous serpent, illustrated with figures. These descriptions and figures were published by order of the Government of Madras, and copies transmitted

* John Gerard Koenig was, it is believed, a native of Courland. He was a pupil of the illustrious Linnæus. He visited Iceland in 1765; and Linnæus named a curious little plant discovered in that remote island, in honour of him, *Koenigia Icelandica*.

to the subordinate settlements and military stations, to be dispersed for general information. One of the most obvious marks of discrimination is, that a poisonous serpent has *no* row of teeth in the upper jaw, which, on the other hand, a harmless serpent invariably possesses.

It may not be improper to mention here, that about this time, the secret of a remedy long in use among the natives for the bite of venomous and rabid animals, and generally known by the name of the *Tanjore pill*, was purchased by the Madras Government from a Brahmin. Besides arsenic and mercury, the medicine was found, upon analysis, to contain one or two unknown ingredients. Having procured parcels of these last, under the Malabar and Gentoo names, Dr. Russell himself made up a considerable quantity of the pills, carefully employing the prescribed proportions of each ingredient. These pills were distributed to the different settlements, with directions to the medical gentlemen, to report their effects, as occasions should occur. From Dr. Russell's own experience, as well as from some interesting communications by Mr. Duffin, then surgeon at Vellore, it appears that this remedy has often proved fallacious, both in cases of the bite of snakes and of mad dogs: still however Dr. Russell, while he admitted that its "efficacy was a matter of difficult discussion," was inclined to think favourably of it, and to encourage hopes that further experience might confirm its good character.

Dr. Russell occasionally employed himself, while in India, in arranging the ample and valuable materials concerning the plague, which he had long before collected in Syria. In 1787 he sent home a fair copy of his labours, and solicited the friendly revisal of his eminent literary cotemporaries, Dr. William Robertson, Dr. Adam Ferguson, Dr. Adam Smith.

Among various incidental communications transmitted to Britain, we shall only mention that, in 1788, he sent to Sir Joseph Banks an account of the *Tabasheer*, or gritty matter found in the hollow stem of the bamboo, and which is supposed in India to be possessed of extraordinary virtues. He sent also specimens of this substance, which were laid before the Royal Society in March, 1790. It was analyzed by Mr. Macie, F. R. S. and found to consist nearly of pure silex.*

In January, 1789, Dr. Russell embarked for England with his brother and family. He at this time deposited his collection of specimens of fishes, and his Indian herbarium, in the Company's Museum at Madras.

In 1791 his Treatise on the Plague appeared in two volumes quarto. In this valuable work, he first gives an account of the plagues at Aleppo, in the years 1760, 1761, and 1762; then a medical account of the disease; this is followed by essays on pestilential contagion, on quarantines, and on lazarettos; with remarks on the police to be observed in the time of the plague: several interesting cases of patients labouring under the disease are given in detail; and a register of the weather during the pestilential season is subjoined.

It has already been mentioned that Dr. Alexander Russell had projected a new edition of his History of Aleppo, and had applied to Dr. Patrick Russell for information on various topics. Dr. Alexander died, however, in 1768, without having accomplished this intention, although he had collected a considerable quantity of new, and valuable materials. "The prosecution of his brother's plan forcibly struck Dr. Patrick Russell, "in the light of a debt due to friendship;"† on this delicate principle he declined to follow the advice of Dr. Robertson, and some other eminent literary friends, who wished

* Phil. Trans. 1791. † Preface to 2d. Edit. p. vi.

him to make a separate publication of his own observations in Syria. In 1794, therefore, he published in two volumes quarto, " the Natural History of Aleppo, by Alex- " ander Russell, M. D. the *second edition*; revised, enlarged, and illustrated with notes, by " Patrick Russell, M. D. F. R. S." The truth however is, that the book was not only "new modelled," as mentioned by Dr. Patrick himself, in the Preface, but many emendations were made, and very large additions were introduced by him, under the modest title of " Editor."

It was above stated, that Dr. Russell had received the sanction of the Government of Madras, to his favourite undertaking of preparing drawings and descriptions of the useful plants of Coromandel. His plan, with a list of the plants he had selected to begin with, was not only honoured with the approbation of the Honourable Court of Directors at home, but (with a liberality becoming the first mercantile Company in the world, and which has at all times induced them to encourage whatever has appeared calculated to promote science in the East) they resolved to provide for the publictiaon, in the most splendid style, of such figures and descriptions as should be sent home; and at the same time requested the Right Honourable Sir Joseph Banks, to take the general superintendance of the whole: this gentleman, with his well known zeal in all matters of science, kindly undertook the task. Before advice of this favourable disposition of the Court of Directors could reach India, Dr. Russell had embarked (as already mentioned) on his return to Britain. " The task, however," as he himself observes in the Preface, " fell fortunately into hands well qualified for carrying it into execution." He here alludes to Dr. William Roxburgh. Between the years 1790 and 1795, that gentleman transmitted about five hundred specimens, with drawings and descriptions, from India. Dr. Russell, according to his own very modest account, " lent his assistance in correcting the letterpress of the Descriptions." The Preface was from his own pen. Eight fasciculi have been already published, under the title of " Plants of the Coast of Coromandel, from Drawings and Descriptions presented to the Honourable Court of Directors by William Roxburgh, M. D. published by their Order, under the Direction of Sir Joseph Banks, Bart. P. R. S.

In 1799, the Privy Council of Great Britain, alarmed by reports that the Plague had broke out in the Levant, resolved to adopt measures to prevent the infection being brought into this country. They appointed a Committee to draw up quarantine regulations, and to report their opinion and advice as to the permanent measures of precaution which ought in future to be adopted. The celebrity of Dr. Russell's Treatise on the Plague naturally led to his being asked to lend his assistance to the Committee. This he cheerfully granted; and in his attention to this piece of public business he was indefatigable. The regulations approved of by a majority of the Committee did not, in Dr. Russell's opinion, go far enough: he judged more strict and rigorous prophylactic measures to be necessary; and he was not singular in his opinion: his reasons of dissent were signed also by Sir Lucas Pepys, and, with the exception of one paragraph, by —— Boone, Esq. This dissent accompanied the final Report of the Committee in March, 1800, and was printed along with it. It may be considered as a valuable document, highly interesting to this country. By some strange oversight, the important and solicited services which Dr. Russell at this time gratuitously rendered to his country, were never acknowledged even by a letter of thanks, although the Doctor was the only member of the Committee who did not hold some official situation under Government.

Previous to his appointment as Naturalist to the India Company, Dr. Russell, as before

observed, had made considerable progress in collecting snakes, and making experiments on the effects of their bites:—a branch of natural history hitherto little understood or attended to, and to many, from the appearance of the animals, exceedingly disgusting and terrific. He continued his researches with unwearied zeal; and after his return home, the Honourable Court of Directors took upon themselves the expense of publishing coloured figures of the Snakes, accompanied with descriptions by Dr. Russell. The first volume was completed and published in 1796, under the title of "An Account of Indian Serpents collected on the Coast of Coromandel, containing Descriptions and Drawings of each species; together with Experiments and Remarks on their several Poisons, by Patrick Russell, M. D. F. R. S. presented to the Honourable Court of Directors of the India Company, and published by their Order, under the Superintendance of the Author." The first and second fasciculus of the second volume were published under the Doctor's eye, in 1801 and 1802.

It was before stated, that when on the Coast of Coromandel, Dr. Russell had paid particular attention to the fishes caught there, and had deposited his collection of specimens in the Company's Museum at Madras. The drawings and descriptions of these he carried with him to Britain, and presented to the Court of Directors; and in 1803 there appeared, in two large and elegant volumes folio, "Descriptions and Figures of Two Hundred Fishes, collected at Vizagapatam, by Patrick Russell, M. D. and published by Order of the Court of Directors, under the Superintendance of the Author."

In 1804, he had laid before the Royal Society,* "Remarks on the voluntary expansion of the skin of the neck of the Cobra de Capella, or Hooded Snake." His friend, Everard Home, Esq. surgeon, added a description of the structure of the parts which perform the office of expansion.†

Dr. Russell died in London on the 2d of July, 1805, after a short illness of three days.

Dr. Russell was never married. He named Sir Hugh Inglis, Bart. and Josias Duprèe Porcher, Esq. along with his brother Claud, to be his executors. In a paper addressed to them, he gave particular instructions as to his funeral, which, as exhibiting a trait of his character, is here inserted: "It is my request to be interred in the nearest burial ground, in the most private manner that custom will permit, but not be deposited within the walls of any place dedicated to public worship."

In strict conformity with these directions, he was interred 6th July, in Mary-le-bone burying-ground, in presence of a few of his intimate friends. It may be remarked, that Dr. Russell having taken many opportunities of reprobating the practice of burying in churches, as useless to the dead, and prejudicial to the living, thus gave a last practical testimony against the custom; and in the privacy which he requested, may be traced the habitual humility of his mind.

In his library the Executors found a sealed parcel, containing books directed for the British Museum, which was accordingly sent unopened to that national repository. In obedience to special instructions, a Botanical Cabinet, consisting chiefly of Indian plants, was transmitted to the University of Edinburgh; and a considerable collection of specimens of serpents, including all those received from India after his return home (many of which his sudden death prevented him from describing), was deposited in the Honourable Company's Museum at the India House.

* Phil. Trans. for 1805.

† The only other works of Dr. Russell, not here enumerated, are, a paper in the Transactions of a Society for the improvement of Medical and Chirurgical Knowledge, London, 1800, giving an account of two cases of Small-pox and Measles existing in the same person at the same time; and one of an ague in a child in utero.

The reputation of Dr. Russell in the literary and scientific world has been established by the various publications which have been mentioned. In zeal for the advancement of natural knowledge he could not be surpassed. While he paid due attention to the description and nomenclature of plants and of animals, he never failed to attend also to their peculiar habits, and to the useful purposes, if any, to which they might be applied. The discrimination of noxious from harmless serpents, was a service done, not merely to science in general, but to every individual who has occasion to visit tropical climates. Dr. Russell's writings are remarkable for perspicuity of style, and unaffected simplicity. His unassuming manner of expressing himself, serves only to engage the reader to rely more implicitly on what he says, and convince him of his scrupulous integrity.

In private life he was a most affectionate relative; and many still alive can testify the warmth and zeal of his friendship. He was a lively and agreeable companion, gentle in his manners, and liberal in his ideas; close in argument, and occasionally strong in censure. In his person he was rather above the middle stature, with a very expressive countenance, and an uncommonly penetrating eye.* In his address he was polite; and in his ordinary conversation he displayed a pleasant vivacity. He was remarkable for cheerfulness of temper; and this happy disposition continued to the last, although a defect in hearing had unluckily for some years encreased so much as to deprive him in a great measure of the enjoyment of society. Many of his familiar letters written from abroad, and in possession of his relations in Scotland, are highly interesting and amusing: they are pictures of his conversation; often exhibiting a lively imagination, with a witty playfulness of thought and expression.

Since Dr. Russell's death, the third fasciculus of the second volume on Indian Serpents has been published (1807) from manuscripts prepared for the press by himself. The fourth fasciculus, which completes the second volume, derived chiefly from the same source, is now presented to the public.

November, 1809.

* The Portrait which accompanies this account, is taken from a picture by Mr. Vartlet of Bath, when the Doctor was in his 55th year, and now in the possession of his brother, Mr. Claud Russell.

INDIAN SERPENTS.

No. I.

BOA.

Abdominal Scuta 209
Sub-caudal Scuta 47 } 256.

Called by the natives *Gedi Paragoodoo*, and *Pakta Poola*.

THE *head*, a very little broader than the neck, small, ovate, roundish, depressed above; the rostrum compressed, obtuse. The principal laminæ, or plates, covering the head, are ten in number, besides some smaller behind. The lamina, in front of the rostrum, triangular; the anterior pair (between the nostrils,) roundish; the next pair nearly of the same form, but larger; of the three between the eyes, the central, broad shield-form; the lateral, oblong-lunulate; the large posterior pair, *semi-cordate*, bordered by four small laminæ: the scales on the occiput, small, orbicular.

The *mouth* middle size; the lower jaw shorter than the upper. The teeth in the lower jaw fewer than in the upper, small, sharp, reflex; in the upper, two interior, or palatal rows, regular, numerous, equal, but (as constantly observed in venomous serpents,) no exterior, or marginal row.* The fangs, or poisoning teeth, remarkably slender and short, one on each side emergent from the sac: there sometimes are two; but always small, in proportion to the size of the animal.

The *eyes* lateral, small, orbicular. The nostrils close to the point of the rostrum, large, open.

The *trunk*, round, nearly of equal thickness from the neck to within four or five inches of the tail; circumference, where thickest, about two inches and a half. Scales ovate, close, imbricate; but on the middle of the back and the tail, they are orbicular, and larger.

The *length*, from the point of the rostrum to the end of the tail, two feet five inches.† The *tail*, tapering gradually, ends in a sharp point, and measures only four inches.

* It should be recollected that serpents not venomous, have three rows of common teeth, or holders, in the upper jaw; one exterior, or marginal, and two interior, situated, seemingly, in the palate: but in venomous serpents, this marginal row is wanting. Wherever, therefore, a marginal row of teeth is found in the upper jaw, it is in vain to search for fangs: on the other hand, where the two interior rows can only be discovered, it is a strong presumption of the existence of poisoning organs, although fangs are absent, (which may happen by accident,) or cannot easily be detected without dissection.

† In order to avoid repetition, it may be proper to observe here, that in speaking of the length of the animal, the tail is always included: though in general, the length of the tail is mentioned separately afterwards.

The *colour*, a very dark blue, brightening a little in certain lights, while in others it appears almost black: but the trunk and part of the tail, are variegated by cross, curve, dotted, white, lines, at unequal distances; varying, however, in number, in different subjects, from forty-two to fifty. The squamæ, towards the abdomen, are of a dun colour; the scuta, abdominal as well as sub-caudal, of a yellowish white.

OBSERVATIONS.

The Gedi Paragoodoo is not uncommon at Vizagapatam: I have met with it also at Boni; and young ones were sent to me from Masulapatam, under the name of Cobra Monil.

The natives of India, who commonly exaggerate the noxious properties of their snakes, assert that its bite produces immediate death; the truth of which I was led to suspect, from finding, on repeated trials, that it seldom killed chickens in less than half an hour, and dogs in less than one hour and ten minutes.

A more particular account of experiments on its poison, will be given hereafter, among those on the poisons of other venomous serpents. It need only be remarked here, that it appeared to be slower in its operation than the poison of the Cobra de Capello, as well as that of the Coluber, next in malignity, called Katuka Rekula Poda; and was generally observed to produce less violent convulsions, but a greater degree of stupor than either of them.

No. II.

BOA.

Abdominal Scuta 150
Sub-caudal Scuta 25 } 175.

Called by the natives *Horatta Pam.*

The *head* broader than the neck, but much smaller than the middle of the trunk; depressed, obtuse, broad-ovate; covered with very small, carinated, ovate scales, without any large laminæ.

The *mouth* small; the lower jaw somewhat shorter than the upper. Two rows of palatal teeth, above, but no marginal row: the fangs, proportionally long; one on each side emergent from the sacs.

The *eyes* lateral, large, orbicular, very forward. *Nostrils* close on the rostrum, distant from each other, roundish.

The *trunk* gradually swelling from the neck, and tapering towards the tail, is at the middle two inches and a half in circumference. The scales carinated, oval, imbricate; but

those next to the scuta larger than the others, and ovate. The length, one foot three inches and a half. The *tail* tapers suddenly, sharp pointed: in length one inch and a half.

The *colour*, a dark brown, with a row of spots on the ridge of the back, from the neck to the end of the tail, varying in size and figure, but all of a dull-yellowish colour, edged with black. Along each side runs a conspicuous waving fillet of the same colour; and on the head, are four remarkable dark spots, the largest of which bears, in shape, some resemblance to a horse-shoe. The scuta are of a yellowish-white; and each of those of the belly is marked with three or four dusky dots.

OBSERVATIONS.

Specimens of different sizes were found to vary very little in colour, and still less in the spots: the difference in number of scuta was very inconsiderable.

The poisoning organs of this snake show it to be noxious; but in what degree it is so, not having met with a living subject, I had no opportunity of ascertaining. Its bite is represented as very dangerous; and must be highly so, if it be the Viryen Pamboo of the Tamouls, under which name I once received it; for in the directions for using the Tanjore medicine, a double dose is directed to be given for the bite of that snake.*

I was obliged for the specimens of this snake, in spirits, to Major Bonniveaux, who sent them from Arni, in 1778.

No. III.

BOA.

Abdominal Scuta 233
Sub-caudal Squamæ 36 } 269.

Called by the natives *Bungarum Pamah*, and *Sackeenee* in Bengal.

The *head* small, hardly broader than the neck, ovate, crown depressed; the sides from the orbits compressed; rostrum somewhat declining, very obtuse, or sub-truncate. The number of principal laminæ, ten: the first triangular, emarginate; the small pair between the nostrils roundish, with one straight side; the next pair larger, of similar form, a little pointed; the central lamina of the three between the eyes, shield-form, acuminate, the lateral, conical; the last large pair, rudely semi-cordate, truncate: the rest of the head covered with small sub-orbicular scales.

The *mouth* not large; the jaws nearly of equal length. The teeth in the lower jaw

* See Section VII. Case II.

numerous, regular, reflex, very short, almost hid in the gum: in the upper jaw, the teeth in the two palatal rows, also small. There is properly no marginal row, but three small teeth are perceivable on each side, in an unusual situation behind the fangs, standing in an oblique line towards the palate: a singularity described more particularly in Pl. 45. F. xi. The fangs, in proportion to the size of the animal, remarkably short; two emergent from the sac.

The *eyes* lateral, small, orbicular. The *nostrils* very large, gaping, close to the edge of the rostrum.

The *trunk* trigonal, the ridge of the back sharp, the sides declining, the belly convex. The scales on the carina of the back, large, sub-hexagonal, ciliated; the others ovate: all are smooth, polished, closely imbricate, and very adherent.

The *length*, five feet five inches; the circumference where thickest, nearly five inches. The *tail* trigonal, thick, short, with a round blunt point; measures only five inches.

The *colour* of the head a dark blue, with an oblique streak of yellow on each side, from the shield-form lamina to the throat, which is also yellow. The neck, trunk, and tail, are remarkably variegated by broad bands, alternately blue and yellow, which, including the scuta, invest the animal completely round; but the blue of the scuta is lighter: the tip of the tail blue.

OBSERVATIONS.

This snake was sent from Mansoor Cottah, by Mr. Gordon, in November, 1788; it had been bruised a little near the tail, and arrived in a languid, extenuated state. It came with the imputation of being of a very bad kind; which character was afterwards confirmed by some of the hill people from Kimedy, to whom I showed the drawing, and who affirmed that the bite was inevitably mortal.

According to them, its name in the Warrier language was Holadola, but in Gentoo, Ransa Pam.

I have already mentioned that the snake was received in a very languid condition. Being set at liberty, it remained for some time without moving, but soon began to crawl slowly towards a dark corner. A chicken being presented to him at this time, he seemed to take no notice of it, though the bird fluttered about him, and even rested a toe on his head. The chicken was then put on the snake's back, which he held so fast with his toes, that when attempted to be separated, the snake was dragged a little way, without once offering to resent the insult.

At the distance of an hour, the chicken was again presented; but the snake showing no disposition to bite, his jaws were forced asunder, and the naked thigh of the chicken so placed, that the jaws closed upon part of it. The chicken, when disengaged, showed immediate symptoms of poison: it couched, purged once or twice, and was not able to stand. In the course of the first ten minutes, after several ineffectual efforts to rise, it rested the beak on the ground, and the head was seized with trembling. After fifteen minutes, it

showed a frequent disposition to lie down, but remained couched some minutes longer. In twenty minutes lay down on one side, and convulsions supervening soon after, the bird expired within twenty-six minutes.

This was the only experiment I had an opportunity of making, the snake dying next day. From the symptoms of poison appearing so early in this experiment, and considering the languid state of the snake, as well as the reluctance with which he bit, it is probable, had he been in full vigour, that the chicken would have expired in much less time than twenty-six minutes.

I received from Mr. Alexander Russell, of Calcutta, the description of a Bengal snake, under the name Sackeenee, which agreed in all circumstances with the Bungarum Pamah.

No. IV.

BOA.

Abdominal Scuta 209
Sub-caudal Squamæ 19 } 228.

Called by the natives *Padain Cootoo, Manooli Pampoo,* and *Mondi Poda,* at Vizagapatam.

The *head* hardly broader than the neck, oblong, roundish, depressed, sub-truncate; towards the rostrum, compressed; covered with scales, sub-orbicular, minute, but no laminæ, except one triangular at the apex of the rostrum, and two very small between the nostrils.

Mouth rather wide; jaws of equal length. The teeth numerous, small, reflex; a marginal row of teeth in the upper jaw: consequently no fangs.

The *eyes* lateral, small, orbicular. The *nostrils* close to the point of the rostrum, wide, and open.

The *trunk* round, nearly of equal thickness, covered with scales, small, orbicular, carinated, close set, imbricate: but one or two rows nearest the scuta are larger, and not carinated. The length, one foot six; the circumference of the neck nearly two inches; that of the trunk where biggest, not much more than three and one fourth.

The *tail* only an inch and a half in length; thick, taper, sharp pointed, and, on account of the carinated scales, feels rough to the touch: the sub-caudal scuta remarkably short.

The *colour*, a middling brown. The back and the sides variegated by a broad, black, undulating band, with a narrow, yellowish-white margin; as also with a number of irregular, roundish spots of similar colour. Behind each eye there is a black streak, and some yellowish-white scales. The scuta of a pearl colour.

OBSERVATIONS.

The first specimen was sent from Madras by Dr. Anderson, who mentioned, in the letter which accompanied it, "that it was exhibited by the snake-catchers as a show; that it "showed little propensity to bite; that its bite, though not mortal, was said to produce a "slow wasting at the extremities of the fingers and toes, like what happens in the pedda "rocum of the natives: a disease nearly resembling the lepra Græcorum."

That the bite does not prove fatal, may be inferred from the absence of poisonous organs: how far the other effects are justly ascribed to it, is rather a matter of future inquiry, than at once to be rejected.

A second specimen was afterwards sent by Dr. Anderson, under the name of Manooli Pamboo, which was of a lighter colour than the former.

In December, 1788, I received a living specimen from Ganjam, which enabled me to make some experiments on chickens. The snake arrived in excellent order, and bit ferociously; but its bite was followed by no symptoms whatever of poison.

COLUBER.*

In this division of the East Indian Serpents, the Cobra de Capello holds a principal place. It is generally reckoned of all others the most deadly: the occasional expansion of the skin of the neck in the form of a hood, ascertains its identity to the most superficial observer; and as it is every where in the country exhibited publicly, by way of show, it is of course more universally known than perhaps any other of the race of reptiles.

The natives of India pretend to distinguish a great number of species of this serpent, to which they ascribe different degrees of malignity, and apply distinct names; but, after taking the trouble of examining nearly a score of these supposed species, I found the specific marks in most of them so vague, and the venomous property appeared, from experiments, so nearly equal in all, that I thought it superfluous labour to prosecute the inquiry further. I shall, therefore, after describing one species at some length, only add a few remarks on the other varieties.

No. V. VI.

COLUBER.

Abdominal Scuta 185
Sub-caudal Scuta 57 } 242.

Called by the natives *Chinta Nagoo; Coluber Naja, Linn. Syst. Nat. p.* 382; and *Cobra de Capello, Seb. Mus.* 2.

The *head*, hardly broader than the neck, short, broad-ovate, obtuse; the crown depressed; from the eyes, contracted, compressed, and declining to the rostrum. Covered with ten principal laminæ: the first, in front of the rostrum, triangular, the base emarginate; the pair between the nostrils also triangular; the next pair larger, sub-semicircular; the central lamina between the eyes, broad shield-form; the lateral, conical; the semi-cordate pair, slightly acuminate: the scales on the occiput, small, orbicular, and oval.

The *mouth* large; the lower jaw somewhat shorter than the upper. The teeth, few in the lower jaw, sharp, reflex, at regular distances, except in front, where two or three appear closer set, and longer: in the upper jaw, (as usual in other venomous snakes,) there is no

* It should be recollected, that the Coluber, in like manner as the Boa, is furnished with abdominal scuta; but the tail, instead of scuta, is furnished with sub-caudal squamæ, which are counted not singly, but by pairs: thus 120 squamæ are reckoned 60.

marginal row, only two palatal rows of teeth, numerous, reflex, equal, sharp, smaller than those below. Two fangs, one longer than the other, are generally found emergent from the sac on each side.

The *eyes* rather small, lateral, orbicular, prominent. The *nostrils* very near the apex of the rostrum, lateral, large, gaping.

The *neck*, when the animal is at rest, is very little thicker than the head; but the loose skin of the neck being capable, in a peculiar manner, of extension, forms, when the animal is provoked, what is called the hood, which constitutes the principal character of the species. The spectacle-like mark on the hood, is partly formed by the colour of the interstitial skin, discovered in consequence of the separation of the scales; but from Figures 1, 2, 3, Pl. VI. it will appear, that the tint of the scales themselves contributes also, especially in respect to the dark colours; and hence the mark remains in some degree visible in the collapsion of the skin, after death.

The *trunk*, round, covered with scales comparatively small, oval, polished, contiguous, hardly (except on the hinder part and tail,) imbricate, in the living subject; but two rows on each side of the belly, consist of larger scales, ovate, and imbricate.

The *length* four feet; the circumference of the middle of the trunk, four inches. The *tail* round, measures nine inches, covered with sub-orbicular scales, and tapers gradually to a sharp, horny, point.

The *colour*, a yellowish, light-brown; but in certain positions, the glistening scales reflect a faint bluish-ash colour. The interstitial skin is generally white, and the edges of many scales being also white, makes them appear less contiguous than they really are.

The abdominal scuta are very long; the sub-caudal squamæ hexagonal: both are of a dull white, freckled with dusky spots. The colours of the spectacle-mark are bright; (Pl. V.) but the orange tint of the interstitial skin is not so deep, as in some other species.

After so minute a description of the Tamarind Cobra de Capello, it will be sufficient merely to mention a few of the other varieties I have examined, briefly noting under each, any remarkable circumstances that may occur.

Arege Nagoo. *Abd. Scuta* 189. *Sub-caud. Squamæ* 60.

The spectacle-mark (Pl. VI. Fig. 1.) differs somewhat from the former Pl. V. The cervical scuta (Pl. VI. Fig. 2.) are remarkably dark, especially five of them. Two black spots on the inside of the hood (which are common to most of the other varieties,) are also represented in that figure.

Arege is the name of one of the small grains eat by horses.

Coodum Nagoo. *Abd. Scuta* 187. *Sub-caud. Squamæ* 57.

The colour in this variety is rather darker than that in the others, and the colour of the

skin is more yellow; but the principal distinction is in the spectacle-like mark on the hood, which here consists of an oblong, curved frame, without the usual black eye of the others; the skin in the middle being white, and the scales retaining their ordinary yellowish-brown colour. (Pl. VI. Fig. 3.)

Should this, as pretended by the snake-catchers, prove a constant character, it may perhaps be sufficient to constitute a variety. Coodum signifies wheat.

Sankoo Nagoo. Abd. Scuta 183. *Sub-caud. Squamæ* 56.

The chief distinction is the plain hood, without any mark. See Pl. VI. Fig. 4; and Seba, Vol. II. p. 102. T. 97. &c. It was conceived by Seba, to be only the female of the species; but one I brought home with me from India, and presented to the late John Hunter, was a male; and it is certain that the spectacle-like mark on the hood, in the other varieties, is found indifferently in male and female.

It is rarer than the other varieties; and takes the name Sankoo, from a shell so called, which is employed for glazing paper.

Mogla Nagoo. Abd. Scuta 192. *Sub-caud. Squamæ* 65.

This has received its name from frequenting the Caldiero hedges. The cervical scuta are here and there spotted with faint greyish spots, and four of the middle scuta are entirely of a bluish-grey.

Malle Nagoo. Abd. Scuta 191. *Sub-caud. Squamæ* 62.

The colour of this is a lighter brown, and the scuta are whiter, and less spotted; but seven of the pectoral scuta are completely dark. Malle is a name for the Arabian jasmine.

Cumboo Nagoo. Abd. Scuta 186. *Sub-caud. Squamæ* 60.

Some deviations were observable in the shape of the laminæ; all the cervical scuta were dusky, and the trunk had a strong bluish cast.

Jonna Nagoo. Abd. Scuta 189. *Sub-caud. Squamæ* 57.

An orange colour prevails in the skin of the hood; the scuta of the neck are spotted with grey, and six of the lower are wholly of a bluish-grey. Jonna is the name of a small horse-grain.

Nella Tas Pam. *Abd. Scuta* 186. *Sub-caud. Squamæ* 62.

The black on the hood unusually deep, and all the jugular scuta remarkably dusky: hence its name.

Kistna Nagoo. *Abd. Scuta* 186. *Sub-caud. Squamæ* 63.

The middle lamina of the three between the eyes remarkably broad, and the posterior pair sub-ovate, not semi-cordate. Five of the jugular scuta dusky, and six of the pectoral almost black.

Korie Nagoo. *Abd. Scuta* 184. *Sub-caud. Squamæ* 57.

The three laminæ between the eyes remarkably narrow; the large posterior pair oval. The colour of the trunk, more especially of the scuta, unusually bluish.

OBSERVATIONS.

I have already remarked, that the specific distinctions supposed by the natives, were extremely vague; and, so far as my experiments went, that the venomous power of the reputed varieties, were, under the same circumstances, apparently equal. A more particular account of these experiments, and of other matters relating to the poison of the Cobra de Capello, will be given hereafter: it may be sufficient to observe here, as a standard for comparison with other serpents, that I never knew its bite prove mortal to a dog, in less than twenty-seven minutes; and to a chicken, in less than half a minute.

No. VII.

COLUBER.

Abdominal Scuta 168
Sub-caudal Scuta 59 } 227.

Called by the natives *Katuka Rekula Poda.*

The *head* large, much broader than the neck, gibbous, or swelling behind, depressed above, compressed on the sides, and narrowing from the eyes, terminates in an obtuse snout, faced with a pyramidal, emarginate lamina: the labial and sub-jugular squamæ are large and smooth, but the rest of the head is covered with small, ovate, highly carinated scales, without any of the usual large laminæ.

The *mouth* very large, the jaws nearly of equal length; the anterior teeth in the lower jaw, long, slender, almost upright; the others, shorter, few, reflex; the two palatal rows in the upper jaw, small, reflex, thick-set; no marginal row; the fangs conspicuous, longer than those of the Cobra de Capello, thicker and stouter; two generally emergent from the sac, on each side, one smaller than the other.

The *eyes* high, lateral, forward, large, oval, not prominent. The *nostrils*, on the same line with the eyes, close to the point of the snout, very wide and open.

The *trunk* round, thick, beautifully spotted, and covered with oblong-oval, carinated scales, those excepted lying close to the scuta, which are smooth, broad-ovate, larger, and not carinated.

The *length*, four feet two inches; the middle of the trunk two inches in circumference. The *tail* tapers to a sharp point; the scales carinated.

The *colour* of the head and trunk a yellowish brown; the back variegated with above twenty-two large, oblong-oval, spots, brown in the middle, with black borders, edged with white. Of these spots, some are separate, but most of them are joined by a narrow neck, or run waving into each other: small black dots, single, or two or three in a cluster, are sometimes interspersed. A second row of spots adorn the sides, similar in colour to the first, but smaller, and in form more orbicular, each of those on the trunk having a short stem, tending obliquely to the abdomen, made up of smooth, black scales; and in the interstices, angular black spots are disposed along the verge of the scuta. All these spots become more and more obscure as they approach the tail.

The scuta are white and glossy, with a membranous, striated margin, and many of them are marked with one or two dusky, semicircular spots, but which are hardly visible near the tail. The sub-caudal squamæ are of a dusky yellow, and not spotted.

OBSERVATIONS.

The colour in different subjects varies considerably: in captivity, it becomes of a dark brown, and the spots are less brilliant. They vary little in form, but are more or less joined on the back.

The number of the scuta varies inconsiderably. In the subject described it was 59; in another subject, 56; but then three of the squamæ, near the anus, were not reckoned.

It is not less commonly met with, in a wild state, than the Cobra de Capello; but from its not being, like the Cobra and some other snakes, exhibited as a public show, it is not so universally known, either among the natives, or Europeans. Nevertheless it is doubtful whether its poison is not equally deleterious with that of the Cobra de Capello: it may at least claim a second place. Its bite proved mortal to chickens, in thirty-six seconds; and to a dog, in twenty-six minutes.

No. VIII.

COLUBER.

Abdominal Scuta 241
Sub-caudal Squamæ 32 } 273.

The *head* of equal breadth with the neck, oblong, depressed, obtuse; the rostrum somewhat compressed. The lamina in front slightly emarginate; the first pair between the nostrils, oblong, transverse; the next orbicular, larger; the three between the eyes, unusually round; the posterior pair, short, semi-cordate.

The *mouth* very small; the jaws nearly of equal length. The lower teeth, and the two palatal rows in the upper jaw, small, sharp, reflex: there is no marginal row. One fang appears on each side emergent from the sac, so small as to escape observation, on a transient view.

The *eyes* lateral, proportionally large, orbicular. The *nostrils* also lateral, very small.

The *trunk*, round, smooth, about the thickness of a goose-quill; in length eleven inches, and scarcely tapering; the scales smooth, sub-ovate, imbricate. The *tail* round, measures little more than an inch, not much smaller than the trunk, but ends in a sharp point.

The *colour* of the trunk, a light, yellowish-brown, with a dotted black line, running from the head to the tail, along the middle of the back; and some fainter fillets on the sides. The head is black; and the tail at its origin and near the point, is singularly marked with a black spot, whitish in the middle, and edged with whitish-brown lines. The scuta are of a pale orange colour, deepening near the anus; the splendent, sub-caudal squamæ, resemble white porcelain curiously speckled with black.

OBSERVATIONS.

In June, 1788, while botanizing in the plain near Nerva, I rescued the subject now described, from the hands of some peasants who were about to destroy it. They could not inform me of its name, but assured me its bite was mortal: a fact afterwards contradicted by several of the inhabitants of Nerva, who asserted that it only occasioned pain.

The peasants had hurt it, but it still remained active; showing however more disposition to escape, than to snap offensively.

Being provoked to bite the breast of a chicken, it held firm hold for nearly a minute: yet the bite was followed by no symptoms of poison.

The smallness of the mouth, and a reluctance to disfigure a subject intended for preservation, by opening the jaws too wide, prevented determining whether it had fangs or not:

a circumstance which has since been fully ascertained, from examination of the specimen that I deposited in the British Museum.

No. IX.

COLUBER.

Abdominal Scuta 170
Sub-caudal Squamæ 58 } 228.

Called by the natives *Bodroo Pam.*

The *head*, much broader than the neck, sub-trigonal, gibbous behind, above depressed, the rostrum obtuse, compressed; the crown covered with very small, smooth, orbicular scales, except a small lamina above each eye: the scales on the rest of the head, small, but slightly carinated. The sub-jugular squamæ, linear, and truncate.

The *mouth* large; the jaws nearly equal. The teeth small, regular, reflex; two palatal rows, but no marginal row, above. Two fangs, remarkably long, emergent from the sacs, on each side.

The *eyes* lateral, large, oval, prominent. The *nostrils* near the eyes, very wide, open.

The *trunk;* the back somewhat carinated, the sides compressed, or sub-declining. The scales, acute-ovate, carinated, imbricate.

The *length* two feet six inches; the circumference of the neck an inch and a half; of the thickest part of the trunk, two inches one third. The *tail*, round, slender, obtuse: measured five inches.

The *colour;* the head, trunk, and tail, of a fresh green; the last row of squamæ on the belly, yellow. The scuta of a pale straw-colour, and some of them have a small, green, spot, on each side.

OBSERVATIONS.

This snake, which had been caught two days before on the hills in the vicinity of Vizagapatam, was brought to me in October, 1788; and as I had never met with it before, nor heard of any other green snake besides the Passeriki Pam, (No. XII, XIII.) I conceived it to be rather uncommon.

It looked fresh and lively, was very alert, hissed, and snapped at every thing opposed to it, yet did not offer to touch a chicken which was walking about in the same room. It prepared for an attack somewhat in the manner of the Mega Rekula Poda, (No. XXXII.) but was not nearly so fierce, nor did it contract the neck and trunk into such close wreaths.

The remarkably long, slender, fangs, exposed on opening the mouth, betokened its being highly noxious; but the peasants who brought it, affirmed that its power of killing extended only to the smaller animals; not to dogs or sheep; and that to man, its bite caused various disorders, but never death.

The experiments made on its poison, will be given in their proper place.

No. X.

COLUBER.

Abdominal Scuta 143
Sub-caudal Squamæ 70 } 213.

Called by the natives *Wanna Pam. Coluber Stolatus, Linn. Syst. Nat. p.* 379.

The *head* somewhat broader than the neck, obtuse-ovate, depressed, rather short, covered with nine principal laminæ, besides some smaller. The anterior pair, small, sub-rotund; the next irregularly pentagonal; the central lamina between the eyes narrow, shield-form, the lateral conical; the large posterior pair, oblique, oblong, semi-cordate, with two or three small laminæ on each side.

The *mouth* large, the lower jaw somewhat shorter than the upper. The *teeth*, small, sharp, reflex; a marginal, and two palatal rows in the upper jaw.

The *eyes* large, orbicular, protuberant. The *nostrils* near the point of the rostrum, large, and open.

The *trunk* round, invested with oval, thick-set, carinated, scales; two rows only next the scuta, not carinated.

The *length*, one foot and a half; the circumference of the neck one inch and a fourth; the trunk, where thickest, seldom exceeds two inches and a fourth. The *tail* tapers rapidly, the last inch becoming excessively slender: in length four inches and a half.

The *colour* of the head and neck a very dark green; the cheeks and throat yellow. On the neck are two blackish bands, from which a yellowish-brown fillet runs on each side along the trunk and part of the tail, variegated with small white spots nearly at equal distances, and opposite to each other. Besides these, most part of the trunk between the fillets, is adorned with broader, transverse, whitish bands; and between the fillets and the abdomen, with waving, interrupted, longitudinal, white, lines. The ground *colour* between all these, approaches to black. From within a few inches of the anus, the trunk and part of the tail, retain only the plain, yellowish-brown fillet, on each side. The scuta and sub-caudal squamæ are of a dull pearl colour, and the former often have a black dot on each side.

OBSERVATIONS.

I had no opportunity of making trials with the living snake, but from its want of poison organs, I conclude it to be innocuous.

The C. Stolatus of Linnæus, is marked poisonous; but that this is a mistake, has been very justly observed by Dr. Gray.* The present subject has a marginal row of teeth above, but no fangs.

This specimen was sent by Dr. Roxburgh from Raja Mundrah in 1788, without a name; but I afterwards received two specimens from Ganjam, sent by Mr. Snodgrass, under two different names, though with no material difference in other respects.

	Scut.	*Squam.*	
Neerogady	146	77	223
Neergady	147	71	218

No. XI.

COLUBER.

Abdominal Scuta 145
Sub-caudal Squamæ 66 } 211.

Called by the natives *Wanna Cogli, Wanna Pam. Coluber Stolatus, Linn. Syst. Nat. p.* 379.

This agreeing in all material points with No. X. is certainly only a variety of the same species, and therefore requires no minute description. In comparing the figures, some variation may be remarked in the form of the laminæ of the head: in the present subject the anterior pair are more exactly triangular, and the posterior truncate; but both specimens have carinated scales, and are destitute of poison organs. The principal distinction consists in the colour, and that might perhaps have suffered some alteration from the spirits.

The prevalent colour dark, with a greenish cast. From the neck to the tail on each side runs a yellowish-brown fillet; and the neck, as well as the anterior half of the back, have between these fillets a number of cross, black, bands, which are continued on the sides, without intersecting the fillets. The scuta were of a dusky yellow, changed perhaps by the spirits. The above memorandum was taken at the time.

* Philosophical Transactions, Vol. 79. Part I.

OBSERVATIONS.

The Wanna Cogli was sent in July, 1788, by Dr. Roxburgh, from Samul Cottah.

The Wanna Pam, Wanna Cogli, Neerogady, and Neergady, are only several names for the same species.

A snake, which I received from Bengal, under the name Kurharria, is also the same, with only a little variation in the number of sub-caudal squamæ.

Abdom. Scut. 144.
Sub-caud. Squam. 77.

No. XII.

COLUBER.

Abdominal Scuta 178
Sub-caudal Squamæ 166 } 344.

Called by the natives *Passeriki Pam, Pastiletti. Coluber Mycterizans, Linn. Syst. Nat. p.* 389.

The *head* much broader than the neck, oblong, depressed above, rounded on the sides, then compressed, and contracted at the eyes, protruding into a long, straight, angular, pointed rostrum, which resembles the beak of a bird, with a small, soft, obtuse, reflex, process, at the extremity.

The *occiput* is covered with sub-orbicular, imbricate, scales; the crown and rostrum with eleven laminæ: the two anterior of which are pyramidal, rounded at the base; the next pair nearly of the same form, but larger; next, a small pair triangular: the central lamina between the eyes, spatula-form, those on the sides, conical; the posterior pair semi-cordate.

The *mouth* wide, the upper jaw a little longer than the lower, the scale in front not emarginate. The *teeth* reflex, slender, sharp; the anterior in both jaws less close, thicker, and longer: a marginal, and two palatal rows, in the upper jaw.

The *eyes* lateral, large, oval, prominent; of a golden colour. The *nostrils* small; on the side of the rostrum near the apex.

The *trunk* somewhat triangular, the back being slightly carinated, the sides declining, the abdomen flattish. The scales linear-lanceolate, loosely set on the neck and fore part of the trunk, but on the rest closely imbricate. The scales on the ridge of the back, and those next the scuta, are rounder, or ovate.

The *length* (a large subject,) four feet six inches, of which the tail comprehended one foot ten inches. The circumference of the neck three fourths of an inch, the thickest part

of the trunk little exceeding an inch and a half. The *tail* round, remarkably long and slender, covered with ovate, imbricate, scales, sharp pointed, and so small near the end, that it is difficult to count the sub-caudal squamæ.

The *colour*. The head has the appearance of being covered with green velvet, with a yellow streak on each cheek; the rest, including the neck, the trunk, and the tail, is of a yellowish grass-green, when the animal is at rest; but when provoked, the neck and part of the trunk swells; and the scales, which there lie looser, separating from each other, discover the white interstitial skin, and some very dark scales, hardly observed before, which, together with the white and black edges of some of the other scales, produce a beautiful variegation: the green, however, predominating. When the inflation ceases, or the animal dies, the scales fall again close together, and the uniform green colour takes place.

From the throat to the anus, on each side of the belly, runs a yellowish-white fillet, which, becoming of a deeper yellow, is continued along part of the tail; two narrower fillets, of a bright yellow colour, run along the middle of the abdominal scuta, but are not continued on the tail. The scuta and squamæ are of a light yellowish-green.

OBSERVATIONS.

This snake is very common about Vizagapatam, and, I believe, in the Circars, as well as in the Carnatic. It is often found on trees; and is said to attack passengers, aiming particularly at the eyes: but of this I never met with any instance. Its bite on chickens, tried repeatedly, produced no other effect than pain.

The number of sub-caudal squamæ in this snake, varies considerably in different subjects: the number of scuta is more constant. It may further be remarked, that, from its extreme slenderness, the tail is often found mutilated.

The Coluber Mycterizans is marked by Linnæus as venomous; a mistake, which has very justly been corrected by Dr. Gray, in his ingenious paper on the subject of Amphibia, read before the Royal Society.*

* Philosophical Transactions, Vol. 79. Part I.

No. XIII.

COLUBER.

Abdominal Scuta 174
Sub-caudal Squamæ 148 } 322.

Called by the natives *Botla Passeriki.*

This snake agrees exactly in most circumstances with the one last described. The *head* considerably thicker than the neck, oblong, depressed above, rounded on the sides, and contracting at the eyes, is lengthened into a long, straight, angular, pointed rostrum, which resembles the beak of a bird, with a small, soft, obtuse, reflex, process, at the extremity. The occiput is covered with sub-orbicular, imbricate, scales; the crown and rostrum with eleven laminæ: of which, the two anterior are pyramidal, rounded at the base; the next pair nearly of the same form, but larger; next, a small pair sub-triangular; the central lamina between the eyes, spatulate, those on the side, conical; the posterior pair, semi-cordate.

The *mouth* wide; the upper jaw a little longer than the lower, the scale in front not emarginate. The *teeth* reflex, slender, sharp; the anterior, in both jaws, less close, thicker, and longer: a marginal row, in the upper jaw, and two palatal rows.

The *eyes* lateral, large, oval, prominent; of a golden colour. The *nostrils* small, on the side of the rostrum near the apex.

The *trunk* somewhat triangular; the scales linear-lanceolate, except on the carina of the back, and in the row on each side of the scuta, where they are broad-oval. On the neck and fore part of the trunk, they are loose, and only contiguous; on the rest, close, imbricate.

The *length* four feet one inch; the circumference of the neck one inch and a quarter, that of the trunk, where thickest, two and a half. The *tail*, round, very slender, covered with ovate, imbricate, scales, tapers to a sharp point: in length, one foot six inches and a third.

The *colour*. The head, as in the former, seems as if covered with green velvet; the lips and sides of the throat of a deep yellow. The trunk and tail of a fresh grass-green, with a white fillet intersected by orange lines, running along the edge of the scuta, on each side of the anus, and down half the tail along the edge of the sub-caudal squamæ. The variegation of colours, when the animal is enraged, is much more conspicuous in this than in the former snake, and is produced in the manner already described; but remains in some degree visible even in the dead animal, the black scales being more numerous, and the margins of more of the green scales being either black or white. An attempt has been made to represent it in the drawing, from a living subject.

A most striking difference may be remarked in the colour of the belly and under part of

the tail, which in the former snake were both of a light yellowish-green; but here, both scuta and squamæ are of a cineritious colour, blended with a faint pink, freckled elegantly with minute, black, and dusky-yellow, dots, while the inferior margins of the scuta, tinged with a dark yellow, form a succession of transverse, convex, fillets.

OBSERVATIONS.

This snake is much seldomer met with than the one before described. It is in appearance much more ferocious; elevating its head and neck like the Cobra de Capello, opening the mouth wide, hissing furiously, and snapping at every thing opposed to it. Its bite, however, on chickens, produced no other bad effect than pain, which soon ceased; and though the upper fore-teeth may sometimes be mistaken for fangs, it certainly possesses no poisonous organs.

Whether it is to be considered as distinct from the Passeriki Pam, I shall not take upon me to determine; but on a comparison of the two descriptions, circumstances sufficient may be collected to constitute at least a variety.

No. XIV.

COLUBER.

Abdominal Scuta 175
Sub-caudal Squamæ 56 } 231.

Called by the natives *Jara Potoo.*

The *head* a little broader than the neck, small, ovate, depressed, obtuse, with nine plates, or laminæ; the occiput covered with small, yellowish, imbricate scales. The two anterior plates, between the nostrils, small, orbicular; the next two larger, irregularly angular; the two lateral between the eyes, conical; the middle one, shield-form, acute; the two posterior, semi-cordate.

The *mouth* middle size; the jaws nearly equal. The *teeth*, a marginal and two palatal rows, above; the anterior teeth in the marginal row being somewhat longer than the others.

The *eyes* lateral, globular, prominent. The *nostrils*, at the edge of the rostrum, large, open.

The *trunk* round, polished, covered with small, ovate, close, imbricate, scales.

Length, one foot, three or four inches. Thickness, near the head, of a goose-quill; in the middle of the trunk, somewhat more than a swan-quill.

The *tail* very short, tapering suddenly, and terminating in a blunt point. In length, two inches three fourths.

The *colour* of the laminæ on the head, black; the occiput, the sides of the mouth, and the throat, yellowish-white. The back and the tail, black, elegantly variegated with two minute, white lines, or rows of dots, on each scale. The scuta or sub-caudal squamæ are of the same colour with the throat.

OBSERVATIONS.

This specimen was sent by Mr. Snodgrass from Ganjam, under the name Jara Potoo; but my snakeman called it Candee Poda.

No. XV.

COLUBER.

Abdominal Scuta	229	235	237
Sub-caudal Squamæ	87	85	97
	316	320	334

Called by the natives *Tar Tutta.*

The *head* much broader than the neck, small, round, ovate, obtuse, depressed; covered with nine laminæ: the two smallest, between the nostrils, angular; the next two, irregular square-form; of the three between the eyes, the middle one largest, and broad shield-form, the lateral crescent-shape; the posterior pair cordate.

The *mouth* wide; lower jaw a little shorter than the upper. *Teeth* small, numerous, reflex; a marginal, and two palatal rows, in the upper jaw.

The *eyes*, near the nose, very large, orbicular, protuberant. *Nostrils* small, open, near the point of the rostrum.

The *trunk;* the back slightly carinated; the scales close, oval, polished. The *length*, one foot eleven inches; circumference of the neck, three fourths of an inch; thickest part of the trunk, two inches three fourths.

The *tail* thin, round, tapering to a very small point, which renders it difficult, near the tip, to count the sub-caudal scales: in length, five inches.

The *colour* (in the subject described,) was a light bay, variegated remarkably on the back and sides, with a waving chain of triangular spots, composed of oblique, short, black, lines, intermixed with white, or yellowish lines. These spots growing fainter as they approach the anus, are hardly visible on the tail.

The abdominal scuta are of a yellowish white, with a black, or dusky, dot, on each side: the sub-caudal squamæ have no dots.

On comparing a male and female of this species, the principal difference observed was, that the trunk of the female, near the anus, being much thicker than in the male, made the tail appear to taper more rapidly.

OBSERVATIONS.

This is one of the most common snakes at Vizagapatam. Half a dozen have been found in a night, crossing the road to the Chief's country house. Its bite is said by some to be mortal, but the snake-catchers affirm the contrary, and that it only produces biles and eruptions, a month or two after the bite. The absence of poison organs confirms the first opinion; the other, though improbable, is so prevalent, that it ought not to be wholly rejected, till after further inquiry.

In the month of December, a vigorous subject of this species was made to bite a chicken, which he did very fiercely and repeatedly in different parts. The chicken suffered pain, but showed no signs of poison.

At the distance of two hours, some feathers were plucked from the pinion of the same chicken, and the snake, after two or three snaps, fixing his holders eagerly in the bare skin, held fast for more than a minute. The chicken at first fluttered, and screamed from pain, but soon became quiet. In about half a minute, greatly to my surprise, she let fall her head, and shut her eyes, as if dead. The position of the wing, prevented the cause of this being at first discovered. The snake, unperceivedly, had wreathed its tail round the chicken's neck, and the bird, had it not been rescued, would inevitably have been strangled. Soon after being disengaged, it recovered perfectly.

A second chicken was bitten in like manner, without any consequence; care having been taken to prevent the snake twisting its tail round the bird's neck.

In the month of May, a smaller snake of the same kind was made to bite a young chicken on the bare breast, but no ill consequence ensued.

These experiments were made merely to remove local prejudices; for I myself entertained no doubt of the reptile being not venomous.

No. XVI.

COLUBER.

Abdominal Scuta 174
Sub-caudal Squamæ 40 } 214.

Called by the natives *Gajoo Tutta.*

The *head* broader than the neck, ovate, depressed, obtuse. The first pair of laminæ between the nostrils, small, sub-orbicular; the next, pentagonal; the middlemost lamina of the three between the eyes, broad-lanceolate; the last pair, semi-cordate.

The *mouth* small; the lower jaw shorter than the upper. The *teeth* below, numerous, close, reflex; two palatal rows above, close also and numerous, but the anterior in the marginal row, longer than usual.

The *eyes* lateral, small, orbicular. *Nostrils* close to the rostrum, gaping.

The *trunk* round. The scales, broad-ovate, imbricate. *Length*, fourteen inches. Circumference near the head, one inch and a quarter; the thickest part of the trunk, about two inches; and diminishes inconsiderably till near the tail. The *tail*, very small, tapers suddenly, sharp pointed: length, two inches.

The *colour;* the head a very dark, obscure, green, without spot. The trunk, (including the tail,) almost black, with a dark-greenish cast. The ridge of the back variegated with about twenty narrow spots, composed of longitudinal, short, dusky-yellow, white, and black, lines. Along the sides, and half down the tail, are interrupted rows of short white lines; and from the head to the anus, on each side close to the scuta, there is a regular row of black dots. The scuta and squamæ are of a bluish-white colour.

OBSERVATIONS.

The colour of this snake resembles that of the Gedi Paragoodoo (No. I.); but the variegating spots are very different. The long fore teeth in the upper jaw, on a transient view, might be mistaken for fangs, particularly if the subject has been kept some time in spirits.

It is seldom found at Vizagapatam; and never having been brought to me alive, I had no opportunity of trying its bite: but, from the want of poisoning organs, it may be inferred that it is not so formidable as, by the natives, represented.

No. XVII.

COLUBER.

Abdominal Scuta 144
Sub-caudal Squamæ 59 } 203.

Called by the natives *Karoo Bokadam.*

The *head* somewhat broader than the neck, yet appears small in proportion to the trunk; a little convex above, compressed on the sides, and projecting into a short, obtuse, or sub-truncate, snout, on which the eyes and nostrils are situated. The snout is covered with small laminæ of various forms; the rest of the head with small, sub-orbicular, carinated scales.

The *mouth* not large, the jaws nearly of equal length. The *teeth* close set, regular, small, reflex; a marginal, and two palatal, rows, in the upper jaw.

The *eyes* vertical, small, orbicular, protuberant, each situated in the centre of a remarkable circle of small, triangular, laminæ. The *nostrils* very small, vertical, near to each other, and close to the apex of the rostrum.

The *trunk* thick, round, covered with large, carinated, broad-oval, imbricate, scales.

The *length*, three feet four inches and a half; thickness, near the head, about three inches; the middle of the trunk, four inches and a half.

The *tail* measures only eight inches; is a little compressed, tapers moderately, and terminates in an obtuse point.

Part of the head is almost black; the colour of the trunk and tail, a very dark grey; the throat, belly, and under part of the tail, are of a dusky-yellow; but the colour of the scuta seemed to have been changed by the spirits.

OBSERVATIONS.

He was sent from Ganjam, by Mr. Snodgrass, in July, 1788. I never saw one alive.

Notwithstanding the suspicious appearance of this ugly snake, the want of poison organs, shows he is not formidable.

No. XVIII.

COLUBER.

Abdominal Scuta 198
Sub-caudal Squamæ 84 } 282.

The *head* remarkably small, very little broader than the neck, depressed, obtuse; covered with ten laminæ. The first, triagonal; the pair between the nostrils nearly orbicular; the next pair, oblong-square, transverse; the lateral laminæ between the eyes, sub-ovate; the central, shield-form; the posterior pair resemble the stumps of two thighs.

The *mouth* large; the lower jaw a little shorter than the upper. The *teeth* below, numerous, reflex, regular; above, two palatal rows, and one marginal; as usual in serpents not venomous.

The *eyes*, large, oval. The *nostrils* near the point of the rostrum; not large.

The *trunk* round, covered with oblong-oval, smooth, scales; except near the scuta, where two rows are ovate, and larger.

The *length*, three feet three inches; circumference near the head, above one inch three fourths; the middle of the trunk, three inches.

The *colour*, a dark brown; that of the scuta, seemed to have been altered by the spirits.

OBSERVATIONS.

This snake, (with several others in spirits,) was sent to me from Madepolam, by Mr. Rowley, in September, 1785; but without the native name. The form of the trunk and the tail, and the glistening polish of the skin, gave it, on a transient view, something of the semblance of a very dark Cobra de Capello.

No. XIX.

COLUBER.

Abdominal Scuta 182
Sub-caudal Squamæ 38 } 220.

Called by the natives *Wanapa Pam.*

The *head* a little broader than the neck, oblong-ovate, sub-convex, obtuse, covered with various laminæ. The first lamina triangular, slightly emarginate; the first pair, oblong,

the margins perforated by the nostrils; the next pair similar in form, but rather smaller; the middlemost of the three laminæ between the eyes, bell-shape, the others conical; the posterior pair, semi-cordate.

The *mouth* beneath, wide, the upper jaw projecting beyond the lower. The *teeth* numerous, small, reflex; two palatal rows, and one marginal, in the upper jaw.

The *eyes* distant, orbicular: the *nostrils* also distant, small, on the margins of the laminæ.

The *trunk* round: the scales smooth, ovate, imbricate; the neck about as thick as a goose-quill; the body nearly equal, (tapering only a little near the tail,) hardly exceeds the size of a swan-quill. The whole measures fourteen inches; the *tail* only one inch and a half, round, very small, and sharp pointed.

Between the eyes are two bent, black bands, and a third divides the semi-cordate laminæ of the head. The predominant *colour* of the trunk is a light chestnut; but the trunk, as well as the tail, are elegantly variegated. From the head to the end of the tail runs a yellowish, white, dotted, fillet; parallel to which, on each side, are two broader fillets, the one of a grey, or ash-colour, the other a bay; between the grey fillets are a number of transverse bands, formed of small, distinct, oblique, black lines. The scuta are of a dull pearl-colour.

OBSERVATIONS.

This snake was found at Vizagapatam, in the month of April. It is not common, and appears to be perfectly harmless. Upon repeated trials, it could not be provoked to bite a chicken.

No. XX.

COLUBER.

Abdominal Scuta 140
Sub-caudal Squamæ 49 } 189.

Called by the natives *Paragoodoo.*

The *head* broader than the neck, oblong, ovate, depressed above; compressed on the sides; covered with laminæ of rather unusual forms: the pair between the nostrils small, oblong, curve, rounded in front; the next pair purse-form: of the three between the eyes, the lateral laminæ, truncate cones, the middle, oblong-square, acuminated: the two larger behind, sub-cordate; several small laminæ on the occiput.

The *mouth* large; the jaws protracted, and nearly of equal length. The *teeth* numerous, regular, small, reflex; a marginal, and two palatal rows, in the upper jaw.

The *eyes* sub-oval, protuberant. The *nostrils* near the point of the rostrum, open.

The *trunk* round, swelling and diminishing regularly; covered with oblong-oval, carinated scales. The subject described measured two feet two inches; circumference in the middle of the trunk, about three inches. The *tail* round, very taper, with a sharp point; the length five inches and a half.

The *colour*, a yellowish brown; the back and sides thick set with rhomboidal spots, brown in the middle, with black borders; the spots growing fainter towards the tail. The scuta are of a bright mother-of-pearl; the tail is not spotted, and the sub-caudal squamæ are of a reddish white.

OBSERVATIONS.

This snake is common; and is not by the natives reckoned pernicious. It usually frequents damp grounds, or the borders of tanks; and grows to a much larger size than the one now described.

No. XXI.

COLUBER.

Abdominal Scuta 192
Sub-caudal Squamæ 62 } 254.

Called by the natives *Nooni Paragoodoo.*

The *head* broader than the neck, oblong-ovate, depressed. The anterior pair of laminæ between the nostrils, roundish; the next larger, pentagonal; of the three between the eyes, the lateral, conical; the middle one, shield-form, acuminate; the posterior pair, obtuse, semi-cordate.

The *mouth* large; the labial scales with yellow, rounded, margins. The upper jaw emarginate. The *teeth* very small, reflex, sharp, numerous: two palatal rows above, and one marginal.

The *eyes* lateral, middle size, orbicular, prominent. The *nostrils* near the rostrum, very small.

The *trunk* covered with smooth, imbricate, orbicular, and ovate scales. The *length*, two feet. Circumference, near the head, one inch and a fourth: towards the middle of the trunk, two inches and a half. The *tail* very small, especially towards the end; in length four inches.

The *colour*, cinereitious-grey, with an obscure cast of reddish brown, particularly about the

head and neck. The back variegated by black and white, or black and yellowish, narrow, bands; and on the sides are two or three rows of short, separate, oblique, lines, formed by the yellow, or white, edges of the lateral scales; but in general these bands and lines are not visible on the tail. The scuta and squamæ are of a dusky pearl-colour.

OBSERVATIONS.

The bite of this snake, according to the natives, is not mortal; but they pretend that, after a certain time, it produces ill effects. I made trial repeatedly on chickens, without observing any bad consequences; and the absence of poisoning organs, renders the popular notion of its ill qualities highly improbable.

No. XXII.

COLUBER.

Abdominal Scuta 252
Sub-caudal Squamæ 62 } 314.

Called by the natives *Pedda Poda.*

The *head* broader than the neck, oblong-ovate, obtuse, depressed, but from the eyes to the rostrum compressed, covered with twelve principal laminæ, besides a number of smaller, irregular in shape, and disposed star fashion round the posterior, small, rude, semi-cordate, laminæ. The central lamina between the eyes is the largest; but, contrary to what is observed in most other snakes, it is divided in the middle: the occiput is covered with very small, orbicular, smooth, scales.

The *mouth* wide, the jaws of equal length, the lips thickish, covered with oblong, transverse scales. The *teeth* regular, reflex, sharp; a marginal, and two palatal rows, in the upper jaw.

The *eyes* lateral, orbicular, not large. The *nostrils*, near the edge of the rostrum, round, open in a backward direction.

The *trunk* round, gradually swelling from the neck, and decreasing towards the tail; closely set with minute, smooth, round, imbricate, scales; but three rows next to the scuta consist of larger scales, oval, acuminate.

The *length* two feet nine inches; the circumference of the neck two inches; the middle of the trunk four.

The *tail* round, and tapering rapidly, ends in a sharp point: it measures only four inches two lines.

The *colour;* the upper part of the head, flesh colour; the rostrum cineritious: a broad streak of flesh colour runs obliquely on each side of the neck, and a narrow, short stripe of the same colour, divides a large brown mark on the occiput. The colour of the trunk and tail cineritious, variegated with about thirty large, broad, brown, maculæ, edged with black, of various magnitude, and irregular forms. The sides are spotted with smaller, but similar, maculæ, most of which are whitish in the middle.

The scuta are remarkably small and narrow, of a white colour, with reddish margins: round the posterior edge of the anus, a semicircle of small scales is observable. The squamæ also are small; and the under part of the tail is singularly variegated white and black, the black in long, broadish, streaks.

OBSERVATIONS.

This snake possessed great strength in its body and tail, and often wreathed in such a manner round the arm of the man who held it by the neck, as to numb his hand. But though very active and lively, it was with difficulty made to bite fowls, and then no other consequence followed the bite than temporary pain.

Upon forcing into the open mouth of the snake, the thigh (stripped of the feathers) of a living chicken, the snake, instead of wounding with his teeth, seemed more disposed to swallow the bird entire, and, if at liberty, would probably have done it, after securing his prey with his tail; for in the present case he exerted much force on the arm of the snake-man, which otherwise would have been employed in crushing the bird.

It is a common practice, with those who go about the country exhibiting snakes for a show, to present a large fowl to one of those called Rock Snakes, which the reptile deliberately secures by wreathing round the bird's body, and then very slowly swallows the whole, feathers and all.

No. XXIII.

COLUBER.

Abdominal Scuta 252
Sub-caudal Squamæ 64 } 316.

Called also by the natives *Pedda Poda.*

The *head* a little broader than the neck, oblong, rounded at the extremity; above, depressed; towards the rostrum sub-compressed, covered partly with numerous laminæ, dissimilar in size, and of various forms, but the occiput is covered with smooth, ovate, scales.

The largest of the laminæ is situated behind the nostrils, of a broad shield-form, and separated from them by two minute, orbicular, laminæ, at each corner.

The *mouth* wide; the jaws nearly of equal length, the lips thickish. The *teeth* regular, reflex, slender; some of the anterior in the lower jaw thicker and longer than the others: a marginal, and two palatal rows, in the upper jaw.

The *eyes* large, oval, prominent, distant from each other; the *nostrils* small, round, separated by a pair of small triangular laminæ.

The *trunk* round, the scales small, smooth, ovate, imbricate; but two or three rows nearest the scuta, are larger and orbicular.

The *length*, seven feet two inches and a half; the circumference of the thickest part of the trunk, eight inches. The *tail*, round, short, and tapers to a sharp point; in length, nine inches and a half. Both scuta and squamæ acuminated, and remarkably small.

The *colour* of the head dark-cineritious, with a deep brown, oblique, streak, behind each eye; and a large, dark, spade-form spot, with a narrow streak in the middle, on the hind head. The neck, trunk, and tail, covered universally with large, dark, spots, of various irregular forms, edged with black, on a light-brownish ground, which is the prevalent colour. The spots on the tail are somewhat lighter than those on the trunk. The scuta and squamæ are of a dusky yellow hue.

OBSERVATIONS.

This snake was sent to me in February, 1788, from Ganjam, by Captain Gent, the engineer, who had kept him captive some time, and fed him with eggs and raw flesh. He was transported in a cage, into which a living fowl had been put, by way of provision on the road; but the fowl arrived safe, though, from the marks remaining on the snake's head, he appeared to have been unmercifully pecked by the fowl on the journey. Perhaps he was tamed by captivity; and indeed seemed remarkably sluggish. He hissed furiously when provoked, but without snapping; and, while with me, he never touched the food put into the cage.

When forced to bite fowls, the wounds were attended with no consequence; and when left at liberty with pigeons or chickens, the snake seemed intent only on making his escape.

DESCRIPTION OF

No. XXIV.

COLUBER.

Abdominal Scuta 256
Sub-caudal Squamæ 69 } 325.

Called also by the natives *Pedda Poda.*

The *head* a little broader than the neck, oblong, depressed above; from the eyes, contracted, sub-compressed, very obtuse, or sub-truncate; covered, anteriorly, with numerous laminæ, various in shape and size; but the occiput covered with ovate, smooth, scales.

The *mouth* very wide; the jaws nearly of equal length, the lips thickish. The *teeth* disposed regularly, reflex, sharp, some of the foremost, in the lower jaw, longer than the others; in the upper jaw, a marginal, and two palatal rows.

The *eyes* proportionally of middle size, lateral, partly covered by the laminæ of the orbit, oval, protuberant. The *nostrils* on the side of the rostrum, small, gaping.

The *trunk* covered with smooth, ovate, imbricate, scales, two rows excepted on the belly, which are orbicular. The scuta are narrow, oblong, acuminate at each end: the sub-caudal squamæ are oval, but likewise pointed. Above the aperture of the anus, on each side, on a line with the last scuta but one, is a small crooked horn, or spur, pointing outwards.

The *length,* six feet; the circumference, where thickest, seven inches. The *tail* measured nine inches, and tapered to a sharp point.

The *colour,* universally whitish, variegated with large, broad, irregularly shaped, brown, or dusky, spots, edged with black. A remarkable brown streak behind each eye, and a large, dark, macula, on the hind head, with a whitish streak in the middle.

OBSERVATIONS.

This snake was killed in a gentleman's stable at Vizagapatam, in 1787. The head and tail only were drawn, and some of the descriptive memoranda taken at the time having been mislaid, the description is more defective than it might have been.

The three snakes last described, under the name of Pedda Poda, belong to those commonly, by the Europeans in India, called Rock Snakes, and are not, by the natives, said to be venomous. They grow, I believe, to a much larger size than the present specimens; for I have seen one of the same species with No. XXIV. above ten feet long.

There is a general resemblance in the laminæ of the head, the form of the maculæ, of the scuta, and the squamæ, as well as in other circumstances, of all three; but the principal affi-

nity is between No. XXIII. and XXIV.; colour constituting the most obvious difference: except the want, in No. XXIII. of the spur, or claw, near the anus.

The Bora, from Bengal, (No. XXXIX.) furnishes another instance of claws situated near the anus; and the Physician General at Madras wrote me, in 1788, "that he had lately seen a "snake, named Dussery Pamboo, which had a claw on each side of the anus, resembling the "spur of a cock partridge; and that the man who showed it, affirmed the claws were occasion- "ally employed as weapons of offence, which sometimes rendered it necessary to cut them."

No. XXV.

COLUBER.

Abdominal Scuta
Sub-caudal Squamæ 120
Called by the natives *Dameen.*

The *head* broader than the neck, broad-ovate, depressed; towards the rostrum compressed, covered entirely with seventeen large, and several smaller, laminæ. The anterior pair are perforated by the nostrils, between which is interposed a pair broad-oval; behind these a pair considerably larger, forming together part of a circle: the three laminæ between the eyes, large, and of equal size: the lateral, utricular; the middle, shield-form, acuminate: the next pair (in the usual place of the semi-cordate laminæ) resemble together a pair of women's stays; the others are mostly square-form.

The *mouth* wide; the jaws nearly equal in length; the *teeth* small, numerous, reflex; a marginal, and two palatal rows, in the upper jaw.

The *eyes* lateral, distant, remarkably large, oval. The *nostrils* on the margin of the rostrum, very small.

The *trunk* round, imbricated with large rhomboidal scales: in length, ———; in circumference, where thickest, four inches. The *tail*, round, taper, pointed.

The *colour*, a dark brown; and the posterior edge of each scale, being marked with a pencil of black lines, the whole appears variegated with numerous, triangular, black spots, regularly disposed. The scuta and squamæ were of a dusky yellow, with ciliated margins, of a dull, lead-colour, forming so many transverse, dusky, bands.

OBSERVATIONS.

For want of a bottle large enough to contain the whole, the head and tail only were sent from Ganjam, in February, 1788; hence the description is defective. Mr. Snodgrass, to

whom I was obliged also for specimens of many other snakes, remarked in his letter, that this Dameen was not, even by the natives, pretended to be venomous.

No. XXVI.

COLUBER.

Abdominal Scuta 171
Sub-caudal Squamæ 41 } 212.

Called by the natives *Karetta.*

This snake, which is not venomous, was found at Hyderabad; but the description of it having been lost, or mislaid, I had it only in my power to give the drawing.

No. XXVII.

COLUBER.

Abdominal Scuta 176
Sub-caudal Squamæ 88 } 264.

Called by the natives *Condanarouse.* *Coluber lineatus, Linn. Syst. Nat. p.* 982.

The *head* broader than the neck, oblong, ovate, depressed above; compressed towards the rostrum; covered with nine laminæ: the first pair between the nostrils, sub-triangular; the next roundish; the middle laminæ of the three between the eyes, lancet-form; the lateral, pyramidal; the last pair oblong-semi-cordate.

The *mouth* middle size; the lower jaw longer than the upper. The *teeth*, below, and in the two palatal rows of the upper jaw, numerous, short, reflex; but the fore-teeth in the marginal row, above, remarkably long.

The *eyes* lateral, large, oval. The *nostrils* small.

The *trunk* round, swelling elegantly from the neck to the tail; covered with oblong-oval, smooth, scales. The *length*, two feet four inches and a half; circumference, two inches one fourth.

The *tail*, very taper, slender, sharp pointed; in length, seven inches and a half.

Colour: the head is of a light brown; a yellow streak behind each eye; the trunk and tail are striped with seven longitudinal bands, or fillets; of which the middlemost, and the two exterior towards the belly, are of a darker brown, with a greenish cast, and broader than the others; two of the other four are almost black, and two of a greenish yellow. The scuta and

one half of the squamæ nearest them are of a straw colour; and a small, darkish-green, thread, runs along each side of the scuta and sub-caudal squamæ, to near the end of the tail.

OBSERVATIONS.

This was sent from Ganjam, in October, 1788, by Mr. Snodgrass; who remarked in his letter, " that among the natives it bore a bad character." It certainly, however, possesses no poisoning organs.

No. XXVIII.

COLUBER.

Abdominal Scuta 138
Sub-caudal Squamæ
Called by the natives *Naugealled Keaka.*

The *head* broader than the neck, ovate, depressed, covered with eleven laminæ, besides several small, smooth, scales. The first lamina, emarginate; the pair between the nostrils small, square-form; the next pair roundish, and angular; the lateral of the three between the eyes, long-oval, the middle one, long, shield-form; the two posterior, (the largest of all) sub-semi-cordate.

The *mouth* small; the lower jaw shorter than the upper. *Teeth* small, sharp, reflex; a marginal, and two palatal rows, above.

The *eyes* small, orbicular: the *nostrils* close to the rostrum, small, linear.

The *trunk* round, nearly of equal thickness to within four inches of the anus, covered with close, ovate, carinated, scales. *Length*, from the nose to the anus, fourteen inches; the circumference, about two inches three fourths.

The *tail* taper; but it had been cut off two or three inches from the anus; and the trunk was broken and bruised in several places, which rendered it difficult to judge exactly of its colour; it seemed to have a leaden or bluish cast, with many small, sagittate, spots, composed of greyish, dusky-yellow, and blackish, scales. The scuta were of a yellowish-white.

OBSERVATIONS.

This snake, in bad preservation, was received from Ganjam in March, 1788. By the account of the natives, transmitted at the same time, it was represented as venomous; but its want of poisoning organs, shows the assertion to be a vulgar error.

No. XXIX.

COLUBER.

Abdominal Scuta 202
Sub-caudal Squamæ 91 } 293.

Called by the natives *Patza Tutta.*

The *head* small, a very little broader than the neck, ovate, depressed, covered with various laminæ, of which the principal are one pair between the nostrils; a second, somewhat larger, but similar in form; three between the eyes, the lateral purse-shape, the middle one, bell-form; the posterior laminæ semi-cordate, truncate.

The *mouth*, wide; the jaws unequal, the lower being considerably shorter. The *teeth* small, sharp, reflex; two palatal rows, and one marginal, in the upper jaw.

The *eyes*, distant, lateral, large, orbicular. The *nostrils*, likewise lateral, large, gaping.

The *trunk* round, closely set with very small, smooth, ovate, scales, those excepted near the scuta, which are orbicular.

The *length* of the snake, one foot eleven inches. The circumference, near the head, one inch; in the middle of the trunk, above one inch and a half. The *tail* in length, is five inches; very taper, and sharp pointed.

The *colour* of the head, trunk, and tail, brown; but the neck and upper part of the trunk, are decorated with about a score of narrow, cross, bands, composed of short, black, and white, lines; behind these, a few other more obscure bands are discernible, of reddish brown, interspersed with white; but the white in these is only the interstitial skin, whereas in the former, the scales were white. The latter bands become less and less visible in approaching the tail. The orbicular scales nearest the scuta, are yellow; and the scuta have a pale-yellowish cast.

OBSERVATIONS.

The bite of this snake on the breast of the chicken, produced no discoloration of the skin, nor did the bird show any symptoms of indisposition.

To another snake of the same species, which appeared very active and lively, a pigeon and a chicken being presented successively, he could not be provoked to bite either, but coiled himself very quietly between them.

The subject above described was sent to me from Casemcottah, in July, 1788, by Captain Gowdie, to whose attention, in transmitting numerous specimens, I was particularly obliged.

I received another specimen from Lieutenant Whyte, from the same place, where the snake would seem to be not uncommon.

No. XXX.

COLUBER.

Abdominal Scuta 159
Sub-caudal Squamæ 52 } 211.

Called by the natives *Mutta Pam.* *Ally Pam.*

The *head* small, a little broader than the neck, ovate, obtuse, depressed, covered with ten laminæ. The first two perforated by the nostrils; next, a solitary, oval, lamina; the second pair, orbicular; the two lateral, between the eyes, conical; the central, shield-form, with a point; the last pair, semi-cordate.

The *mouth* middle size; the jaws nearly equal. The *teeth* small, reflex; a marginal, and two palatal rows, above.

The *eyes* large, oval. The *nostrils* small, not distant.

The *trunk* round; the scales ovate, ciliate, imbricate; but on the belly, orbicular.

The *length*, one foot eight inches; the circumference of the neck, near the head, hardly exceeds one inch and a quarter; of the thickest part of the trunk, seldom more than two inches and a quarter. The *tail*, very short, very small, tapers to a sharp point: somewhat carinated on the back, and compressed on the sides.

The *colour*, a very dark, changeable, blue, without spots. The three orders of squamæ nearest the belly, together with the scuta, are of a whitish yellow; the scuta and squamæ are divided in the middle by a dark-bluish line.

OBSERVATIONS.

This snake was caught in the lake of Ankapilly, in one of the traps employed for catching eels. It was dead when brought to me, so that I had no opportunity of trying its bite; but it is regarded by the natives as harmless.

No. XXXI.

COLUBER.

Abdominal Scuta 181
Sub-caudal Squamæ 130 } 311.

Called by the natives *Goobra*.

The *head* broader than the neck, ovate, depressed, covered with nine laminæ: the pair between the nostrils, oblong, truncate; the next pair, larger, roundish; the central lamina, between the eyes, very narrow, shield-form, acuminate, the lateral, sub-conical; the posterior pair, sub-conical, obverted, truncate, with four smaller, oblong, laminæ, on each side. The hind head covered with small, orbicular, scales.

The *mouth*, large; the upper jaw a little longer than the under. The *teeth* small, reflex; two palatal rows, and one marginal, in the upper jaw.

The *eyes* large, and oval. The *nostrils* large, open.

The *trunk* covered with small linear-oval scales; but the middle of the back is somewhat depressed, and the scales covering it are ob-ovate: on the sides of the scuta, there are two rows of oval scales.

The *length*, three feet two inches; the circumference, about one inch and a quarter. The *tail* very slender, particularly towards its sharp point; length, one foot and half an inch.

The *colour* of the head and trunk, a very dark brownish; but the scales on the middle of the back, of a somewhat lighter brown; towards the scuta, the abdominal, oval, scales, are whitish, spotted with black, nearly to the middle of the trunk; on the remainder of the trunk, these scales are of the same cineritious colour with the scuta.

OBSERVATIONS.

The skin, with a sketch of the head, &c. of this snake, was sent by Mr. Alexander Russell, from Hyderabad, in the summer of 1788. It is said to grow to a much larger size, and chiefly to frequent trees. It had been killed on a tree in the Ambassador's garden.

The drawing having been coloured, partly from verbal description, and partly from the dried skin, it is suspected that the colour of the living snake is very imperfectly represented; for on a minute examination of the dark-brown scales on the sides, many of them were found tipped black above, and with a beautiful azure blue below.

No. XXXII.

COLUBER.

Abdominal Scuta 222
Sub-caudal Squamæ 93 } 315.

Called by the natives *Mega Rekula Poda.*

The *head* small, but broader than the neck, ovate, depressed, and covered with twelve principal laminæ, besides seven of smaller size. The middlemost of those next the rostrum, emarginate; the lateral, perforated by the nostrils; a pair, small, roundish, between the nostrils: the next pair larger, angular, with two small, round, laminæ, on each side; the shield-form lamina, between the eyes, acuminate; the large semi-cordate pair, irregularly shaped, and truncate, with three small laminæ on each side. The scales under the eye white.

The *mouth*, moderate size; the jaws of nearly equal length. The *teeth*, small, numerous, reflex; two palatal rows, and one marginal, in the upper jaw.

The *eyes* high, not large, orbicular, prominent: the *nostrils* near each other, very small.

The *trunk* round, swelling gradually from the neck to two inches and a half circumference, then tapering to the tail: the scales, ovate, close, imbricate.

The *length*, two feet three inches and a half. The *tail* very taper, terminates in a sharp point: it measures five inches three fourths.

The *colour* of the head, an olive-yellow, with a short, oblique, bluish-black, streak, behind each eye; two long streaks of the same colour, with two or three ovate rings between, adorn the neck, while two other streaks cross the throat obliquely. On the rest of the neck, and part of the trunk, a faint pink is blended with the olive-yellow; and a narrow thread of dark blue, with white spots at the angles, runs zigzag, or waving, along the back. But neither the pencil, nor verbal description, can convey an adequate idea of the elegant colouring of this snake, when provoked, and swelling with rage; the colours incessantly sliding into each other, and varying in brilliancy.

The colours of the remainder of the trunk, with the tail, are more uniform and permanent; the waving thread fades gradually, the olive-yellow of the back becomes darker, and a dark-brown fillet is continued along each side to the sharp point of the tail; between which and the scuta, is interposed a double row of white scales. The scuta and squamæ are of a pearl colour.

OBSERVATIONS.

This snake was found at Vizagapatam, in the month of April, and brought to me in an hour or two after it was caught. It appeared singularly alert in its movements, and snapped at every thing presented to it. In preparing to attack, it wreathed its neck, and part of the trunk, into close turns, and at the same time, retracting its head, presented, at a distance, something of the appearance of a hooded snake. When it snapped, the body being more raised by assistance of the tail, the wreaths were rapidly unwreathed, and the head darted obliquely forward, with a motion so rapid, that the animal, without rising from the ground, seemed to fly on his prey. In this manner it could unexpectedly seize an object which in appearance lay far beyond its reach.

A chicken, intended for experiment, having made its escape, was accidentally pursued into the chamber where the snake had been left at liberty, and was no sooner perceived, than the snake flew furiously at him, snapped several times as he passed, and soon seized and secured him, by wreathing round the body. In two minutes the bird was found dead, having been strangled by the snake's tail.

A second chicken was attacked in like manner, and had he not been relieved in time, would have suffered the same fate. He was bitten in several places, but without any consequence.

It was remarkable that, ferocious as this snake appeared to be, he could not, when held in the hand, be provoked to bite a chicken repeatedly presented to him.

No. XXXIII.

COLUBER.

Abdominal Scuta 152
Sub-caudal Squamæ 80 } 232.

Called by the natives *Neeli Koea.*

The *head* broader than the neck, broad-ovate, depressed; compressed on the sides towards the rostrum; covered with various laminæ; the first pair, triagonal, small, between the nostrils; the next pair, quadrangular, somewhat larger; the shield-form lamina, between the eyes, is pointed; the lateral, sub-oval; the semi-cordate pair are very large; and on each side is an oblong, narrow, lamina: besides some others which are smaller.

The *mouth*, wide; the lower jaw shorter than the upper. The *teeth* numerous, small, sharp, reflex; a marginal, and two palatal rows, in the upper jaw.

The *eyes* lateral, very forward, large, orbicular. The *nostrils* close to the point of the rostrum, small, open.

The *trunk*, round, clumsily shaped; the scales on the back, oval, carinated, imbricate; on the sides, not carinated, and two rows next to the scuta, larger, roundish, smooth. The *length*, two feet nine inches and a half; the circumference, three inches and a half.

The *tail* slightly carinated, tapers very gradually till within four inches of its sharp point: length, eleven inches.

The *colour;* the head darker than the rest; two unequal, black, streaks, behind each eye, with a yellow spot between them. The neck, trunk, and tail, of a yellowish brown, with numerous round, black, spots, joined by narrow, black, fillets, regularly disposed in oblique rows; a few scales of lighter yellow being interspersed. On the tail the spots are not joined, and towards the point disappear. The scuta and squamæ are of a yellowish white.

OBSERVATIONS.

From its frequenting the wet paddy fields, this is commonly reckoned a water snake. It moves swiftly, and carries its head high, with a menacing air, in its progression; but, when provoked, it neither hissed, nor did it snap at a stick which was opposed to it.

It seemed rather to avoid a chicken which was set down before it; and could not be provoked to bite, though pecked several times by the chicken. While it lay coiled up, a chicken, properly secured, was laid upon it, but it continued quiet, without attempting to wreath round the chicken, or otherwise to annoy it; and when the bird fluttered and struggled to get loose, the snake, as if afraid, creeped away.

It should be remarked, however, that in the course of this last experiment, the snake threw up a pretty large fish, which appeared to have been but a short while in the stomach; so that its forbearance might, in some measure, be owing to not being hungry: a circumstance that suggested caution against hasty decision. But from what I have observed in other trials on the same species, the Neeli Koea certainly is not venomous, and does not appear to be very irascible.

No. XXXIV.

COLUBER.

Abdominal Scuta 199
Sub-caudal Squamæ 121 } 320.

Called by the natives *Jeri Potoo.* *Coluber Mucosus Linn. Syst. Nat. p.* 388?
Laur. Amph. p. 77. *N.* 156.

The *head* proportionally small, scarcely broader than the neck, ovate, depressed, but towards the rostrum, compressed. Besides the usual laminæ, there are eight or ten, of various shapes, on each side of the hind head. The first pair, orbicular, between the nostrils; the next pair, irregularly square. The shield-form lamina, between the eyes, rather broad above; the lateral laminæ, conical; the two posterior laminæ, irregular hexagons.

The *mouth*, wide; the jaws nearly of equal length; the upper jaw a little divided. The *teeth* numerous, small, reflex; two palatal rows in the upper jaw, and one marginal.

The *eyes* lateral, large, orbicular, prominent. The *nostrils* near the point of the rostrum, small, but gaping.

The *trunk*; the neck covered with scales, small, oval, smooth, imbricate; the back, carinated; the sides, a little compressed; the scales sub-rhomboidal; but four rows on the upper part of the back, are either carinated or striated.

The *length*, five feet four inches. The circumference, near the head, two inches and a half; the thickest part of the trunk, four inches. The tail, taper, small, sharp pointed; measures one foot seven inches.

The *colour*; the cheeks, and sides of the throat, are of a pale flesh, or whitish, colour, streaked transversely, with black lines. The jugular scuta, are of a yellowish-white, each (especially near the head) having a blackish spot on each side. The head, neck, and part of the trunk, are of a dull, yellowish-olive; the rest of the trunk, with the tail, have a lighter yellowish cast, variegated by transverse, black, lines and spots, joined together, which (in an unusual manner) become blacker, or more conspicuous, as they approach the tail. Half the abdominal scuta are of a dull white, strewed with dusky spots; but the inferior edge of each scale is of a purplish-black. The edges of the scales on the tail being black, make it appear as if regularly checkered: the sub-caudal squamæ have the like appearance, but they are of a greenish-yellow.

OBSERVATIONS.

Chickens bitten by this snake showed no signs of poison; they suffered pain, but the parts about the bite did not change colour, and the birds were not visibly disordered.

It is a common snake at Vizagapatam; and is sometimes found of a much larger size than the subject now described.

No. XXXV.

COLUBER.

Abdominal Scuta 188
Sub-caudal Squamæ 55 } 243.

Called by the natives *Katla Tutta.*

The *head* somewhat broader than the neck, ovate, depressed, covered with ten laminæ: the anterior, emarginate; the first pair perforated by the nostrils; the next larger, and roundish; the lateral laminæ of the three between the eyes, conical, the middle lamina, broad shield-form; the occipital pair, semi-cordate.

The *mouth* small; the jaws nearly equal. The *teeth* small, regular; two palatal rows, and one marginal, in the upper jaw: some of the hinder teeth on each side, longer than the others.

The *eyes* small, orbicular, prominent. The first pair of laminæ perforated by the *nostrils*, which are very small.

The *trunk* round, about the size of a large goose-quill, and nearly of equal thickness. The scales smooth, sub-orbicular, imbricate. The *length*, eight inches. The *tail* very taper, sharp pointed: measures only one inch and a fourth.

The *colour* approaches to an olive yellow. The head singularly marked with three triangular, black, fillets, with waving white margins: the first, pointing to the nostrils, extends to the eyes; the second, springing from the shield-form lamina, crosses the semi-cordate, and is continued, diverging, to the throat; the third, broader than either of the other two, touches the semi-cordate laminæ, and diverges on the neck. Along the whole of the trunk, and tail, are about thirty-four transverse fillets, with waving, white margins, which continue, without fading in colour, to the end of the tail. The scuta of a pearl-colour.

OBSERVATIONS.

The above description was made from a living subject, found at Vizagapatam, in April, 1788, which afforded an opportunity of attempting to make it bite chickens and pigeons; but, though fresh caught, and very lively, it could never be provoked to bite either: from the absence, however, of poisoning organs, it may safely be pronounced harmless.

I have been more particular in respect to this snake, as it is not rare, and frequently passes for the Cobra Monil; under which name it had been sent to me, in spirits, from Ganjam, Masulipatam, and other places, before I met with it alive.

No. XXXVI.

COLUBER.

Abdominal Scuta 234
Sub-caudal Squamæ 87 } 321.

Called by the natives *Katla Vyrien.*

The *head* a little broader than the neck, oblong-ovate, depressed, covered with ten laminæ, including that in front of the rostrum: the anterior pair between the nostrils, roundish; the next pair, larger, angular; the shield-form lamina short, obtuse; the lateral, semi-conical; the posterior pair, inverted cones.

The *mouth* middling size; the lower jaw shorter than the upper. The *teeth* small, reflex; two palatal rows, and one marginal, in the upper jaw.

The *eyes* lateral, orbicular, prominent. The *nostrils* very small, close on the margin of the rostrum.

Trunk; the back carinated, the belly flat; the scales sub-orbicular, smooth, close, imbricate. The *length,* one foot five inches; circumference near the head, three fourths of an inch; thickest part of the trunk, one inch and one fourth; it then tapers rapidly. The *tail* measures three inches and a half; is very small, particularly near the end, and terminates in a sharp point.

Colour; there is a yellow spot on the occiput, or beginning of the neck, but the rest of the head, the neck, and part of the back, are of a dark-brown colour, which gradually growing lighter, becomes, in approaching the tail, of a yellowish-brown. From the head to the extremity of the tail, there are found about thirty-six transverse bands, in shape resembling a dice-box: they are of a dusky yellowish-white, sprinkled with brown dots. The scuta (if not changed by the spirits,) are of the same colour as the bands.

OBSERVATIONS.

This snake was sent to me from Vellore, by Mr. Duffin, and supposed to be the Cobra Monil; but the want of poisoning organs showed it was not.

No. XXXVII.

COLUBER.

Abdominal Scuta 243
Sub-caudal Squamæ 82 } 325.

Called also by the natives *Katla Vyrien.*

The *head* broader than the neck, roundish, short, obtuse, covered with nine laminæ: the first two pair nearly equal in size, oblong-square, transverse; the middle lamina between the eyes, square; the two posterior laminæ, truncate.

The *mouth* middling size; the jaws nearly of equal length. The *teeth* sharp, reflex, and (as usual where there are no fangs,) a marginal, and two palatal, rows in the upper jaw.

The *eyes* lateral, round, prominent. The *nostrils* small, round, near the rostrum.

The *trunk* covered with ovate, close, smooth, imbricate, scales; the back carinated; the belly flat.

The *length*, nine inches; thickness, at the neck, about that of a crow-quill; and, about the middle, hardly exceeds the size of a goose-quill: it tapers towards the *tail*, which measures one inch eight lines, and is exceedingly slender, and sharp pointed.

The *colour* of the head, pure yellow; the trunk, and the tail, a dark brown, and, as in the preceding, decorated the whole length by transverse bands, of the shape of dice-boxes, but of a pale yellow, without intermixture of dark dots, except one middle dot on each scale next the scuta. The scuta are yellow, like the bands.

OBSERVATIONS.

This snake approaches in many circumstances so near to the one last described, that it may possibly be only a variety of the same species; or the variation in colour may be ascribed to the difference of age, size, &c.: but I thought it better to give a distinct description and drawing, as it also was sent under the name of Cobra Monil, to which it is no more entitled than any of the preceding harmless snakes, so named erroneously.

It is further remarkable, that though the Cobra Monil is familiarly talked of, by the Europeans in India, as well known, and highly venomous, yet, after much pains employed in the search, I never could procure the real animal; all those brought to me under that name proving innocent snakes, except the small, young specimens of the Boa, No. I. already described.

No. XXXVIII.

COLUBER.

Abdominal Scuta 169
Sub-caudal Squamæ 50 } 219.

The *head* a little broader than the neck, ovate, obtuse, depressed; covered with ten laminæ: one in front of the rostrum, emarginate; the next pair perforated by the nostrils, small, roundish; a pair similar in shape, but larger; the central lamina between the eyes, broad shield-form; the lateral, nearly oval; the hindermost pair, semi-cordate.

The *mouth* small; the jaws nearly equal. Two palatal rows of *teeth*, and one marginal, in the upper jaw.

The *eyes* lateral, small, oval. The *nostrils* almost close to the apex of the rostrum.

The *trunk* round; scales smooth, ovate, imbricate. The *length*, one foot nine inches and

a half. Circumference, (near the head,) one inch and a fourth; the rest of the trunk, about two inches and a half. The *tail* short, sharp pointed; in length, three inches and a half.

The predominant *colour*, a duskish clay. On the neck, a remarkable oblique, broad, black, mark, with a waving, yellowish, or white, margin, of a triangular shape, the point towards the occiput. The trunk and tail are variegated with two or three and twenty cross bands, with similar borders, which continue bright in colour to the end of the tail.

OBSERVATIONS.

This snake, without a name, was sent from Arnee, by Major Bonniveaux, and received in October, 1788.

If it is not the same species with No. XXXV. it certainly bears a strong resemblance. The two remarkable fillets on the head are, however, wanting here, and the mark on the neck, differs in shape from the third fillet in the former: but the cross bands on the trunk, are nearly alike both in shape and colour; the number of the latter, however, instead of thirty-four, is only twenty-two, and the difference of the united scuta and squamæ is twenty-four. Another circumstance in which they differ, is the form of the scales; in the former they were sub-orbicular, here they are ovate.

No. XXXIX.

COLUBER.

Abdominal Scuta		265.
Sub-caudal Squamæ	36	
Scuta	28	67.
Squamæ	3	

Called by the natives *Bora*.

A description of this Bengal snake, with a sketch of the head and tail, was received from Mr. Alexander Russell, of Calcutta, in June, 1788.

The *head* a little broader than the neck, oblong, depressed, the rostrum sub-compressed, very obtuse. The hind head covered with very small, ovate, scales; the rest, with a number of laminæ, as represented in the figure.

The *mouth* wide, the jaws equal. The *teeth* in the lower jaw large, reflex, sharp; in the upper jaw, a marginal row, and two palatal rows, as in the serpents that have no fangs.

The *eyes* lateral, orbicular, large. The *nostrils*, very near the point of the rostrum.

The *trunk* round, covered with small, smooth, oval, scales, closely imbricate: but there are two rows of larger scales on each side of the belly. The scuta are remarkably short; and a little above the anus, on each side, is a small spur, about the fourth of an inch in length, of a horny texture, curve, with the sharp point turned outwards.

The *length*, four feet ten inches; circumference of the neck, two inches; of the middle of the trunk, five inches one fourth.

The *tail* round, short, (measuring only seven inches and a half,) taper, pointed. The sub-caudal squamæ, thirty-six in number, are followed by twenty-eight complete scuta, between which and the point, are six (or three pair of) squamæ.

The predominant *colour*, brown. All along the back are large, roundish, spots, of a light brown in the middle, the edges of a yellowish-brown; the sides are variegated by brown spots on a whitish ground, which brightens in approaching the belly. The scuta are of a pearl-white.

It is pretended, that though the bite of the Bora does not prove mortal in less than ten or twelve days, it is very soon followed with eruptions on different parts of the body.

OBSERVATIONS.

The Bora of Bengal bears a strong resemblance, in many circumstances, to the Pedda Poda, (No. XXIV.) formerly described. The description of the sub-caudal squamæ and scuta, (supposing it to be constant,) forms indeed a material distinction; but in the laminæ of the head, and the spurs near the anus, there is a pretty exact agreement: not to mention the number of abdominal scuta, which differs only nine, and the sub-caudal squamæ and scuta, which, taken together, differs only two.

The spurs in both seem in all respects alike; and Mr. Russell, who kept the snake alive for some time, had an opportunity of examining them particularly.

That its bite ever proves mortal, seems highly improbable; and the effect of producing cutaneous eruptions, is so often by the natives ascribed to the bite of snakes which are known to be harmless, that their reports of that kind are always to be received with due caution.

No. XL.

COLUBER.

Abdominal Scuta	145		194.
Sub-caudal Scuta	21	49	
Sub-caudal Squamæ	28		

Called by the natives *Hurriah*.

The *head* scarcely broader than the neck, ovate, obtuse, depressed; towards the rostrum, compressed. The laminæ, (including the one in front of the rostrum,) in number ten, but vary somewhat from the usual forms. The first, triangular; the first pair perforated by the nostrils; the second, oblong-oval; the central lamina, between the eyes, obverse-ovate; the

lateral, somewhat like crescents; the posterior pair roundish, acuminate at top: some smaller laminæ on each side.

The *mouth*, not wide; the jaws nearly equal. The *teeth* very small, reflex; a marginal row in the upper jaw, and two palatal rows.

The *eyes* lateral, orbicular. The *nostrils* small, round, near each other.

The *trunk* round, nearly of equal thickness from the neck to the anus, covered with very small, ovate, scales.

The *length*, fourteen inches; the diameter where biggest, one inch. The *tail* measures three inches, and is remarkable for the combination of scuta and squamæ. From the anus to the commencement of the squamæ, it diminishes gradually; after which it tapers rapidly, and ends in a sharp point.

The *colour*, black, with a brownish-yellow fillet, on each side, the whole length. The scuta of a pearl-white.

OBSERVATIONS.

This snake was found at Hyderabad, by Mr. Alexander Russell, who sent a sketch of the head, the neck, and the tail, together with a description, from which the rest of the drawing was made.

He remarks, that it was not uncommon, and not reputed venomous.

I have met with nothing like the anomalous singularity in the tail, except in the Bora of Bengal.

No. XLI.

ANGUIS.*

Abdominal Squamæ.
Sub-caudal Squamæ.

Called by the natives *Nalla Wahlagillee Pam.*

The *head*, oblong, round, bulging behind, sub-convex above, a little compressed laterally, and projecting into an obtuse rostrum. The occiput covered with small, orbicular, scales; the rest with laminæ. The anterior pair, oblong-roundish, perforated by the nostrils; the next pair, smaller, roundish, pointed; the central lamina, between the eyes, rude shield-form, very much acuminate; the lateral, conical, obtuse; the posterior pair, oblong-oval: there are besides, several small laminæ.

The *mouth* very large, the jaws long, narrow, nearly of equal length, or the lower rather longest. The *teeth* small, numerous, sharp, reflex: a marginal, and two palatal rows, above.

The *eyes* lateral, middle size, oval. The *nostrils* vertical, near each other.

The *trunk;* the back highly carinated, the sides declining; the scales, orbicular, very minute, thick set, innumerable, not imbricate. *Length*, two feet four inches; circumference, where thickest, nearly three inches; but the skin every where very loose. The *tail* thin, flat, rounded at the end; and measures three inches only.

The *colour* of the head and back, black, with a pretty broad band, brimstone-colour, running from the cheek to within two inches of the anus; the belly is of a dusky greenish-yellow, with some obscure, round, black, spots, towards the tail, which is singularly spotted, white, black, and yellow.

OBSERVATIONS.

This sea snake, according to the Vizagapatam fishermen, seldom approaches the shore: several of them had never seen one before. They pretended it was of a very dangerous kind, which is contradicted by the want of poisonous organs.

It was found on the beach in January, 1788; and a second, but much smaller, was brought to me in the May following.

* The Anguis is distinguished from the Coluber, by the want of scuta; both belly and tail being covered with squamæ, which, in the present subject, cannot be counted; but in other subjects admit of being reckoned in series.

No. XLII.

ANGUIS.

Abdominal Squamæ 151
Sub-caudal Squamæ 120 } 271.

Called by the natives *Rondoo Talooloo Pam.*

The *head* not broader than the neck, ovate, obtuse, convex, covered with laminæ of unusual shapes. The first pair small, perforated by the nostrils; then one lamina, transverse, resembling a flask with a short neck; the next between the eyes, broad-oval; the next, sagittate; and, behind all, two, long-oval, lying obliquely on the occiput.

The *mouth* not wide; the jaws unequal. The *teeth* small, numerous, reflex; a marginal, and two palatal rows, in the upper jaw.

The *eyes* lateral, small, sub-oval, not prominent. The *nostrils* close to the point of the rostrum, very small.

The *trunk* cylindric, nearly of equal thickness, from the head to the end of the tail. The scales small, orbicular, imbricate, and each having a black dot, eight or ten, parallel, dotted, lines are formed, running from the head to the end of the tail.

The *length*, ten inches and a half; thickness, about that of a swan-quill.

The *tail*, round, smooth, hardly tapers, point blunt; measures four inches and a half.

The *colour*, a reddish brown; but part of the tail is cineritious, or of a pale blue; the abdominal and sub-caudal squamæ are of a glossy white, without dots.

OBSERVATIONS.

The natives call this, as well as the smaller, (No. XLIII.) the double headed snake, though it so visibly differs in every respect, except in its mode of progression, either end foremost. It is very alert in its movements, and quickly buries itself in the sand, when pursued.

The tail is so much longer than that of the Anguis Meleagris of Linnæus, that I am in doubt whether it can be referred to that species.

No. XLIII.

ANGUIS.

Called also by the natives *Rondoo Talooloo Pam.*

The *head* of this small reptile is roundish, not broader than the neck, obtuse, three or four laminæ on the fore part; behind, covered with scales.

The *mouth* very small, placed under the rostrum, when the animal is on its belly. There are either no teeth, or I could not discern them.

The *eyes*, vertical, orbicular, prominent. The *nostrils* minute, near the point of the rostrum.

The *trunk* round, nearly of equal bigness, but tapers a little from the tail to the head; covered every where with sub-orbicular scales, closely set, not to be counted on the belly. The *length* about six inches; the size of a hen-quill.

The *colour*, a cream-colour, powdered with innumerable black dots.

OBSERVATIONS.

Though the mouth, and the anus, are very visible to the naked eye, this reptile vulgarly passes for a snake with two heads; owing probably to its moving head or tail foremost, indifferently. It moves with incredible swiftness; and when immersed in ordinary spirits, remained alive more than ten minutes.

It is not uncommon at Vizagapatam; and is held to be mischievous, which I consider as a vulgar error.

No. XLIV.

ANGUIS.

Called by the natives *Tatta Pam*. *Anguis Scytale, Linn. Syst. Nat. p.* 392?

The *head* hardly broader than the neck, small, roundish, obtuse. The first pair of laminæ triangular, perforated by the nostrils; the next pair triangular also, but smaller; the middle lamina of the three between the eyes, hexangular; the posterior pair, as large as all the others, oval, acuminate in front: behind these, are three small angular laminæ.

The *mouth* not wide; the jaws of equal length. The *teeth*, small, reflex, regular; a marginal, and two palatal rows, in the upper jaw.

The *eyes* lateral, orbicular. The *nostrils* vertical, round, open.

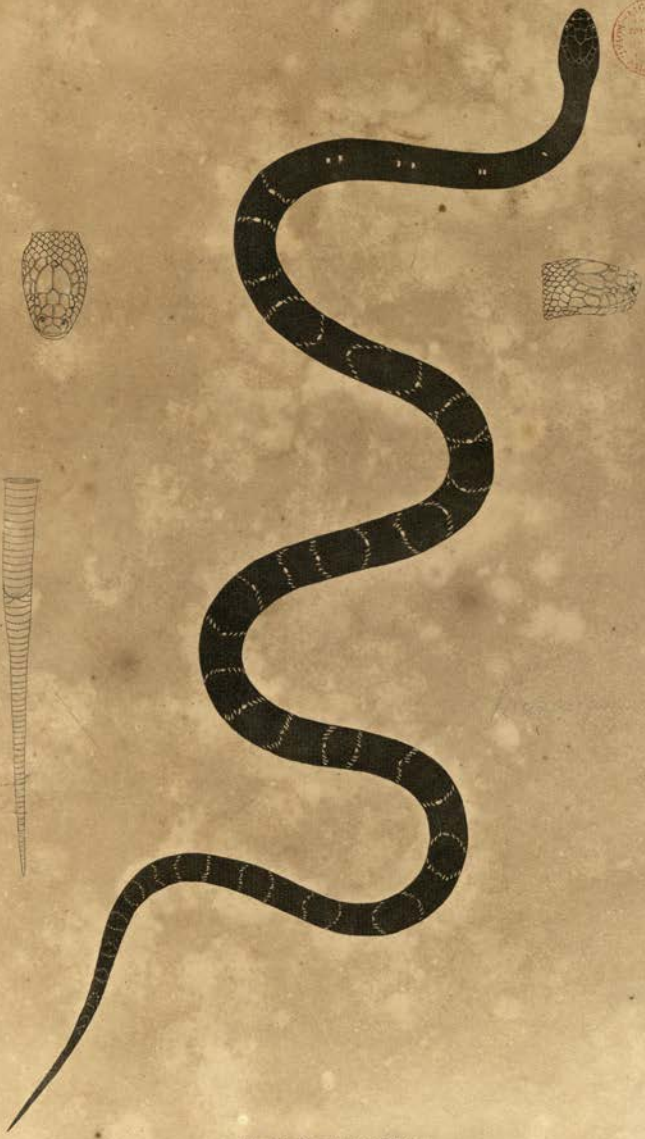
Trunk; the neck round, smooth; the scales small, ovate, imbricate; the back carinated, the sides declining, the belly roundish; the scales on the trunk, as well as on the tail and the belly, orbicular, close, not imbricate.

The *length*, nineteen inches and a half; the circumference, three fourths of an inch, but towards the tail, where thickest, one inch and one fourth. The *tail*, flat, two edged, rounded at the end, with a small point: measures only two inches.

Colour: the head black; the trunk and the tail also black; but on the sides are fifty-eight yellowish-white, conical, spots, with the points towards the ridge of the back, some of which (on the neck, and near the tail,) join their points together: the tip of the tail not spotted.

OBSERVATIONS.

This snake was found on the sea-beach at Vizagapatam, in August, 1788. It was very alert in its motions, but showed no disposition to bite. Being put into a vessel with some sea water, with a view to preserve it for experiment, it died in a few minutes.



Cedi Paragoodoo

Nardon ornavit Pecht.

Horatio Phin.

Bungarus fasciatus

Bungarus Pamah

Padam Coetoe.

Vagoo.

Nagoe.

Naja Laticeps

Nagoo.

Coluber Melanurus (Shaw)

Coluber prasinus (Shaw)

Godron. Lam.

Wanna Pam.

Wanna Cogli.

Pafseriki Pam.

Boïga Patseriki.

Jara Poloo

Tar Tatta.

Lycodon aulicus-

Cajoo Tutta

Coluber Cerberus.

Kerivo Tokadam.

Coronella Temminckii

Wampa Pam.

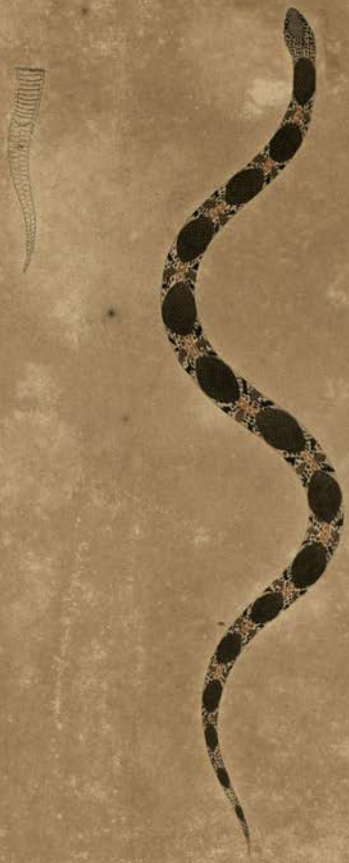
Patnpoodoo.

Nouv. Paraguay.

Pedda Poda. Peddapoda

Pedda Poda. B.

Dameen. J. Lamen



Kinetia.

Coudanarouse.

Naugealled Keaka.
naugallead Keake

Paiza Tutta.

Paiza tutta.

Homalopsis Buccata (Schneid.)

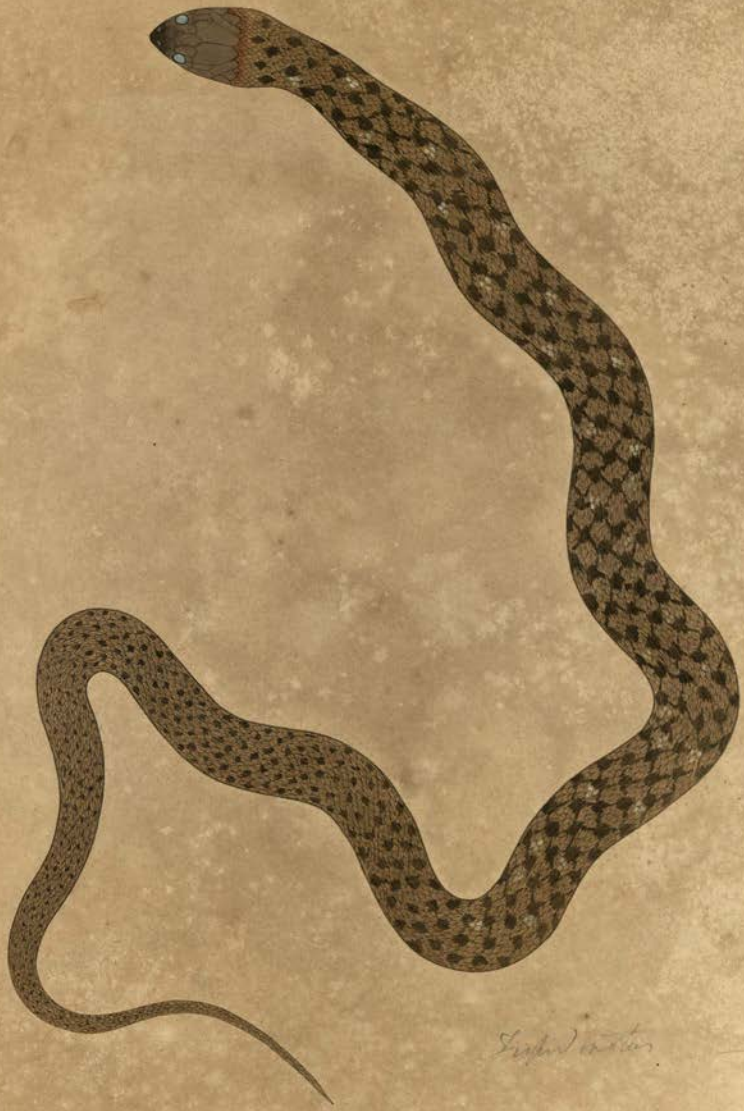
♀

Mutta Pam.

Coobra

Mega Rekula Poda.

mega Rekula poda



Neeli Koea.

Lycodon Capucinus
Boie
Boie Russellii

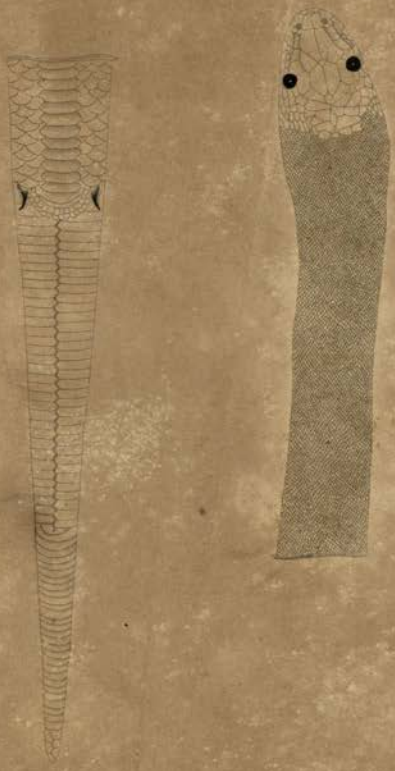
Katla Tuitta.
Katla tuitta

Hydrus nympha -

Katla Vyrien.

Katla Vyrien. A.

Tomodes Perniciosus.
Lycodon Capellii



Hurriah.

Natta Wahlagillee Pam.

Rondoo Talooloo Pan

Tatta Pam.

EXPERIMENTS AND REMARKS

ON THE

POISONS

OF

SEVERAL INDIAN SERPENTS;

AS ALSO ON THE

EFFECTS OF SOME REMEDIES

AGAINST THEIR BITE.

CONTENTS.

SECT. I. *Experiments on the Poison of the Gedi Paragoodo.*

SECT. II. - - - - *the Cobra de Capello.*

SECT. III. - - - - *the Katuka Rekula Poda.*

SECT. IV. - - - - *Bodroo Pam.*

SECT. V. *Experiments on the artificial Insertion of the Poison of Serpents into the Bodies of living Animals.*

SECT. VI. *Experiments on Remedies applied against the Poison of Serpents.*

SECT. VII. *Of the Effects of the Poison of Serpents on the Human Body.*

SECT. VIII. *Miscellaneous Experiments and Observations on Serpents.*

Explanation of Anatomical Plates.

INTRODUCTION.

Of forty-three Serpents, examined and described in the present collection, seven only were found furnished with poisonous organs. An account of the effects of the poisons of four of these, viz. the Gedi Paragoodoo, No. I.; the Cobra de Capello, No. V.; the Katuka Rekula Poda, No. VII.; and the Bodroo Pam, No. IX.; is given separately, in the four following Sections. In regard to two others, viz. No. III. and No. VIII. the few experiments made on them have been subjoined to the respective descriptions. On the venomous Boa, No. XI. having only seen the dead subject, there was no opportunity of making trials.

The experiments related in the other Sections, chiefly respect the poisons of the Cobra de Capello, and the Katuka Rekula Poda, as subjects procurable with less difficulty, and their poisons, in quality, being the most highly deleterious.

Upon comparing the effects of the poisons of five East Indian serpents on brute animals, with those produced by the poisons of the rattle snake, and the European viper, it may in general be remarked, that they all produce morbid symptoms nearly similar, however much they may differ in the degree of their deleterious power, or in the rapidity of its operation. The bite of a rattle snake, in England, killed a dog in two minutes: the bite of the most pernicious snakes mentioned in the following Sections, was never observed to kill a dog in less than twenty-seven minutes.

That the poison of serpents must have precisely the same effect on man, as on brute animals, would be rather a rash assumption; at the same time it will not be disputed, that attentive observation of their operation on brutes, may suggest important hints, and contribute to throw light on the mode of their operation on man.

It need hardly be remarked, that a variety of experiments, inadmissible in the human species, may be made on such animals as can, at all times, be readily infected, either artificially, or by the bite of the living reptile; and that such experiments, judiciously conducted, while they ascertain (in respect to these animals) the natural or undisturbed progress of the disease, as well as the effects of remedies, where remedies were applied, must afford many important inferences, which cautiously, but with great probability, may be extended to the human subject.

The following Experiments are by no means offered as completely satisfactory. Some of them serve only to suggest hints for further inquiry; and others require to be repeated, multiplied, or varied, before general conclusions can safely be established.

EXPERIMENTS, &c.

SECTION I.

Experiments on the Poison of the Gedi Paragoodoo. No. I.

Experiment I. *August*, 1788.——A snake of this species was received from Bimblipatam, after a journey of seven hours, in so languid a state, that it was with much difficulty he was made to bite a chicken on the breast: a little speck of blood was visible on the skin, but without any mark of the fangs having acted; so that I imagined the bird had not been injured: within twenty-five minutes, however, it began to droop; and in a few minutes more, growing rapidly worse, it expired, without any considerable convulsion, in about forty minutes from the bite.

Experiment II.——At the distance of five days, the same snake was found in high vigour, and beauty; having in that interval changed his skin. A chicken, bitten by him in the pinion, was soon seemingly seized with stupor, though it still continued to walk, or to remain motionless on its legs. In ten minutes, it was unable to stand; and within the quarter of the hour, lay along the ground as if asleep. In twenty minutes, it made several vain efforts with its wings to raise itself from the ground; and these were frequently repeated, in the course of four or five minutes, reclining its head now on one side, now on the other. Soon after this, it was slightly convulsed, and at the expiration of the half hour, it died.

The wounded part was not discoloured, but the comb, and sides of the mouth, became of a dark red, and the beak, and some of the toes, were livid.

Experiment III. *August* 17.——A Gedi Paragoodoo, which had been caught at Casem Cottah the day before, was made to bite a stout, large, dog, on the thigh, near the groin. The animal held fast for more than twenty seconds, but the fangs seemed to have penetrated no deeper than the skin; there was barely an appearance of blood, and some poison was found about the supposed place of the puncture.

The dog howled a good deal, when wounded; but, on being set at liberty, walked about without any symptoms of poison. In ten minutes, he urined, and the wounded thigh was a little drawn up, but he still continued on his legs. In a quarter of an hour, he couched and howled; the motion of the thigh was visibly more impaired, though he was still able to raise himself. In twenty-five minutes, being forced to rise, both hind legs were observed to be paralytic.

In the course of the second hour, he grew manifestly more disordered; he did not howl much, but vomited more than once; became more torpid, and lay along on one side, panting. At the end of the second hour, he died, having scarcely suffered any convulsions.

I examined the part bitten, four hours after death, and found it hardly swelled, or discoloured: a circumstance different from what usually is observed in the bites of other venomous snakes.

Experiment IV.——A slender bitch was bitten, near the groin. It was fifteen minutes before any signs of being infected appeared in the limbs, and then they were very slight. In fifty minutes she lay down on her side, visibly more disordered; and, being forced to rise, at the end of the hour, both legs were become paralytic, but the bitten thigh in a greater degree than the other: she immediately lay down again, and vomited a little; convulsions soon followed, which continued, more severe than in the former case, till her death; that is, till one hour ten minutes after the bite.

SECTION II.

Experiments on the Poison of the Cobra de Capello. *No.* VI.

Experiment I. *June*, 1787.——A dog, bitten on the inside of the thigh, by the Comboo Nagoo, howled at first as if in much pain. After two or three minutes, he lay down, and continued, at intervals, to moan and howl. After twenty minutes, he rose, but stood with difficulty, and was unable to walk; his whole frame seemed greatly disordered. He soon lay down again, and, in a few minutes, was seized with convulsions, in which he expired, twenty-seven minutes and a half after the bite.

Experiment II. *July*.——A large, very stout dog, was bitten by another variety of the Coluber Naja, in the inside of the thigh. In a minute or two, the thigh was drawn up; which in general is the first symptom of the poison having taken effect. He continued, however, nearly an hour, walking on three legs, seemingly not otherwise disordered; he then laid himself along, showed great inquietude, but did not howl; purged once. About this time, he became in an uncommon degree convulsed about the head and throat, and made several vain efforts to rise; both hinder legs being now paralytic. In this state he continued above an hour, and then expired: two hours and half a minute after the bite.

Experiment III.——A black bitch was bitten in the usual place of the thigh, immediately after the dog in the former experiment. Showing no signs, for an hour and a half, of being affected, she was bitten in the other thigh, by a Cobra, which had been kept several days without biting. Though the snake bit fiercely, no consequences were observed, for above two hours, after which I did not see her; but in the third hour, she became disordered in the usual manner, and expired in five hours after the second bite.

Experiment IV.——A strong dog, bitten in the usual place, did not appear to be disordered, till after one hour, when he began to droop; but the legs were not affected. In twenty minutes more, he howled a little, and both hinder legs were then observed to have become paralytic. From this time, he grew gradually worse; and, after some slight convulsions, he died: within an hour and forty-eight minutes from the bite.

Experiment V. *July* 20.——A Scinta Nagoo (Tamarind Cobra) was made to bite a strong dog, in the usual place of the thigh. He very soon showed signs of being infected, and in half an hour appeared much disordered. In the second hour, he seemed to grow worse, he panted much as he lay on his side; and, at one time, suddenly starting up, he howled dismally, and was seized with an universal trembling. He then fell into a stupor, in which he continued one hour; but at the end of four hours from the bite, he appeared pretty well recovered.

Experiment VI.——The snake in the preceding experiment, after having bit another dog, was made to bite a chicken in the thigh, which had previously been well rubbed with oil. For a quarter of an hour, the bird showed no signs of disorder; it then began to droop, could hardly move from its place; and growing gradually more dull and stupid, it expired in an hour and twenty minutes, without convulsions.

Experiment VII.——Another chicken was bitten in the thigh, without applying oil; but showing no signs of disorder whatever, it was bitten a second time, at the distance of four hours. It survived the second bite two hours; and, as in Experiment VI. died without convulsions.

Observations.——It may be remarked, that fowls seldom die from the poison, without suffering convulsions in some degree. Their absence in the first chicken, might have been ascribed to the oil; but no oil had been used for the second: and many subsequent experiments showed that oil, rubbed on the part previously to the bite, neither prevented the poison taking effect, nor produced any mitigation of the usual symptoms.

Experiment VIII. *November* 11.——A large dog was bitten in the thigh, by a *Malé Nagoo*, which had been captive only two days. He complained a good deal at the instant of the bite, and the leg was soon drawn up. In twenty-five minutes, he was seized with convulsions, succeeded by a stupor, in which state he lay for ten minutes. The convulsions, however, returned, and he expired in a quarter of an hour: fifty-six minutes from the bite.

Experiment IX.——A second dog, but much stouter, was bitten also in the thigh. The snake at first seemed reluctant, but at length, seizing with his holders, he held fast for nearly a minute, and fetched blood. During this time, both fangs were a little protruded, though he did not, to me, appear to strike with them.

This not being deemed sufficient, the snake, with some difficulty, was made to bite a second time. He now struck with one fang only, and held fast with his holders. The inner part of the thigh was intended to be bitten, but the acting fang struck the exterior part, where the skin was thickest.

The dog hardly complained either time. The little blood oozing from the punctures, showed he was wounded; and some poison remained visible on the skin.

No suspicious symptoms followed; nor was the leg, though the thigh had been twice bitten, contracted. He lay down sometimes, seemingly inclined to doze; and once I thought I could perceive a tremulous motion in the muscles of the thigh; but when rouzed, he walked about, and eat what was offered. After eight hours, he was quite well.

Experiment X. *January* 3, 1788.——An *Arege Nagoo*, from which poison had been procured for insertion, the day before, was made to bite a stout dog in the thigh. "In less than a minute, he showed evident "symptoms of the venom having taken effect; he could not put the leg to the ground: and, for more than "two minutes, continued to moan, as if in pain. He remained, nevertheless, standing on his three legs, for "a quarter of an hour; when, growing more stupid and heavy, he lay down: yet, when forced to rise, he "walked about seemingly in good spirits, though obliged to trail the infected limb. He refused food and "drink; and, when left to himself, immediately lay down. He died in about three hours."

For the account of the above experiment, I was obliged to my friend Mr. Briggs, who obligingly undertook it, in my absence on a botanizing excursion.

Experiment XI. *August.*——A Cobra de Capello, which had lost his two longest fangs, but retained two of the second order, was made to bite a very large, stout, dog. At first the dog complained loudly, though the thigh neither was drawn up, nor, for a quarter of an hour, did any symptoms of poison appear. About this time, breaking loose, he was pursued; and after a chase of an hour and a half, was brought back extremely heated and fatigued.

After resting a quarter of an hour, water was offered him, but he would not drink, though he eat some morsels of bread thrown into the water.

It was intended to have given him the Tanjore medicine; but, besides that I was in doubt of his being poisoned, the time of giving the medicine had elapsed.

About a quarter of an hour after eating the bread, he grew sick, vomited, began to howl, and showed much inquietude. After ten minutes, he vomited a second time, and became extremely outrageous; struggled to get loose, snapped desperately at the stake to which he was tied, and howled incessantly. After the second vomiting, he lay down, and was much agitated about the belly and stomach: the muscles of the face were also convulsed. Being made to rise, he walked without any seeming impediment from the hind legs.

At the end of the third hour, he still continued extremely ferocious, in so much that it became necessary to tie his legs. From this time, his howlings and strugglings grew gradually weaker, and the convulsive motions of his face increased; in which state he lingered about an hour longer, and then expired.

Nearly the circumference of half a crown, was quite black, round the part bitten.

OBSERVATIONS.——The symptoms of rage attending in this case, were in a degree beyond what I had ever observed before, or have observed since. The dog seemed quite furious, and gnawed the stick with incredible ferocity.

Could this be accounted for from the agitation excited by the violent exercise of so long a chase, joined to the strong constitution of the dog? And may it be supposed, that the running retarded the mortal effects of the poison?*

That no usual symptoms of poison appeared at first in the wounded thigh; and that no other symptoms came on till after two hours, were remarkable circumstances.

* See Transactions of a Society for the improvement of medical and chirurgical knowledge. Lond. 1793. p. 310. 321.

Experiment XII. *September*, 1788.——A chicken, bitten by a Cobra de Capello, (which had just before bit another chicken, where oil of vitriol was applied to the wound,) lay down on one side, as the other had done, and stretched out its legs, as if about to expire; but it survived the bite one hour and twenty-four minutes; having suffered slight convulsions before death. The chicken to which the vitriol had been applied, expired in twenty minutes.

Experiment XIII.——A chicken bitten on the lower part of the thigh, immediately retired to a corner and couched, but was soon discovered to have lost the use of the leg. It remained constantly couched; and, at the end of two hours, was found in the agonies of death.

Experiment XIV.——A Cobra de Capello, (which had been captive more than six weeks, and fed only with milk, once in seven days,) bit a pig on the inside of the thigh. For some minutes no effects were visible; the animal walked about without any impediment from the wounded thigh. In about ten minutes she couched, and appeared disordered, but did not complain. In twenty minutes, she became visibly more disordered, and lay down, panting, on one side; in which state she remained about a quarter of an hour; she was then seized with convulsions, and expired within less than an hour after the bite.

Experiment XV.——Another Cobra was made to bite the thigh of a chicken. The leg was immediately drawn up; and in about two minutes, the bird, after purging, couched; in a few minutes more, the wounded thigh was perceived to be paralytic. In ten minutes the bird seemed stupified, and slight convulsions supervened: soon after which, it lay down on one side; the convulsions became more violent, and continued at intervals till its death: twenty-five minutes after the bite.

Experiment XVI.——A Cobra received from Ganjam, with fangs remarkably short, (the long ones having probably been lost, or extracted,) bit a chicken in the usual place; but it was doubtful whether the fangs had acted. The bird immediately purged, and soon after couched. After ten minutes, it walked with visible difficulty; and for most part of the first hour, remained couched and dozing.

In the second hour, it grew gradually worse, at times supporting its head by putting the point of the beak to the ground; and often laying the side of the head quite down, while the body remained couched as before. No convulsive symptoms.

At the end of the second hour, the chicken lay on its side, as if expiring; the head and parts about the throat, were slightly convulsed; and it died soon after.

Observations.——Considering it was the first bite of the Cobra, the chicken lingered unusually long; it was remarkable also, that it suffered no strong convulsions.

Experiment XVII. *August*, 1788.——An attempt was made to make a Cobra de Capello bite a Nooni Paragoodoo in the tail, but that being found too small a subject, the belly was bitten, a little above the anus. The snake soon lost its former activity, and when put under a glass shed, coiled itself up. In this situation I left him; and on my return after one hour, found him dead: that is, in about an hour and a quarter after the bite.

The part bitten was a little discoloured, and some of the dry poison had formed a kind of coat over it.

Upon opening the belly, the parts immediately beneath the bite, appeared much inflamed, but I could not discover whether the fangs had penetrated into the cavity.

The lungs seemed much stuffed with blood.

Experiment XVIII.——A Cobra de Capello received from Ganjam, under the name *Satanag*, was made to bite another remarkably large Cobra, brought from the same place, under the name *Coultiah*. The poison was shed on the place, but no marks of the fangs could be perceived, and the Coultiah remained well as before. This experiment was repeated with the like result, though a little blood, as well as poison, was found on the part bitten.

Experiment XIX.——Some days after the last experiment, a *Coodum Nagoo* was made to bite the *Coultiah* in the belly. Both fangs visibly acted; blood appeared on the wound, but no other consequence followed. A *Tar Tutta* bitten immediately after, in the same part, died within two hours.

Experiment XX.——Chickens and pigeons bitten by a Cobra de Capello whose fangs had been eradicated, suffered no symptoms of poison; but when poison taken from the same snake, was inserted into their bodies, by incision or puncture, they suffered the usual symptoms, and very often died.

The above experiments have been selected from a number of others made on the Cobra de Capello, but of which a detail was judged unnecessary, the concomitant circumstances, as well as the result, being found exactly similar.

SECTION III.

Experiments on the Poison of the Katuka Rekula Poda. No. VII.

Experiment I. *October* 17, 1787.——The snake had been caught only two or three days before, and seemed in high spirits.

A chicken bitten in the pinion was instantly infected, seized with convulsions, and expired in thirty-eight seconds.

Upon dissection, nothing remarkable was observed in the heart, nor other viscera.

Experiment II.——Immediately after the chicken, a stout dog was bitten in the thigh. Within less than five minutes, he appeared stupified, the thigh was drawn up, and he frequently moved it, as if from pain. He remained, however, standing, and eat of some bread that was offered to him. He purged. In about ten minutes the thigh became paralytic. In fifteen minutes, he had entirely lost the use of the wounded thigh; he lay down, howled in a dismal manner, and frequently licked the wounded part; making, at intervals, ineffectual attempts to rise. In nineteen minutes, after a short cessation, he again began to howl, moaned often, the breathing became laborious, and the jaws were convulsively shut. The few succeeding minutes were passed alternately in agony, and in stupor. In twenty-six minutes after the bite, he expired.

After death, blood issued from his mouth and nose. The parts around the punctures, upon dividing the skin, were found much inflamed.

Experiment III.——The third subject of experiment was a slender, weakly looking dog. He was bitten in the thigh, and howled loudly. It was intended to have made trial of the Tanjore remedy; which was prevented by the dog breaking loose. After a quarter of an hour, he was brought back limping. In a few minutes more, the thigh appeared completely paralytic, and the dog lay along, dozing; or when he attempted to rise, was unable to support himself. In thirty-six minutes, he seemed to be in the agonies of death; but recovering a little, he sunk again into a doze.

At the end of two hours he rose up, but was unable to stand, and howled as if from pain. The stupor returning, he grew gradually worse; his jaws were locked, and in about half an hour he expired, without suffering convulsions: three hours and a half after the bite.

Experiment IV.——The inner part of the fore thigh of a rabbit, being first divested of its fur, was bitten by the same snake. The thigh was immediately drawn up, but the animal made shift to walk a little, and seemed tolerably alert. In thirty-five minutes, he suffered convulsions, grew perceptibly worse, was unable to get up, and at intervals was seized with an universal tremor. He expired in less than one hour.

This was properly the fifth experiment made this forenoon with the snake, for it had immediately before bit another rabbit, to which remedies were applied. (See Exp. II. Sect. VI.)

Experiment V.——In order to see how far the strength of the venom was impaired, a chicken was bitten on the pinion. It remained seemingly well for two minutes, only now and then fluttering the wounded wing. It then visibly drooped, lay down, soon was convulsed, and expired in somewhat less than six minutes.

Experiment VI. *October* 18.——After a night's rest, the snake was made to bite a large, healthy, stout dog, on the thigh. The dog howled dismally at first, but appearing in no other respect affected than from pain, he was, after an interval of two hours, bitten a second time; yet still without effect.

OBSERVATIONS.——The snake seemed sluggish this morning, and bit rather reluctantly, so that it was doubtful whether the fangs had penetrated the skin: that the venom was sufficiently potent appeared from the next experiment.

Experiment VII.——The snake, with some difficulty, being provoked to bite a chicken, the bird expired in convulsions, in little more than a minute.

Experiment VIII. *October* 20, 1787.——The inside of the thigh of a stout dog being held close to the mouth of the snake, it snapped, and kept fast hold for twenty seconds. The dog hardly complained when bitten; and no symptoms following, it was concluded the fangs had not acted. Waiting therefore an hour, the dog was bitten a second time, when one, at least, of the fangs visibly entered the skin; yet without any consequence.

Experiment IX.——After making the snake shed some poison on a stick, for the purpose of insertion, he bit a chicken in the thigh. The bird was instantly affected, and died with the usual symptoms, in one minute and a quarter.

Experiment X. *November* 10.——A pretty stout dog, bitten on the thigh, complained much from the pain, and soon lay down. After five minutes, signs of poison were apparent. At intervals he howled lamentably, and within the half hour, was strongly convulsed. He survived, however, nearly an hour and a half longer, most part of the time in a torpid state, without any return of strong convulsions; but, for half an hour before his death, a remarkable tremulous motion was observed in the muscles of the wounded thigh.

Experiment XI.——Immediately after the former, another dog, of a much slighter make, was bitten in like manner. The usual symptoms of poison appeared, though in a low degree. The wounded leg was contracted, and the dog lay, at times, torpid and panting, but he neither howled, nor was convulsed.

After a few hours, he was so well recovered, as to eat heartily, and to tread firmly.

Experiment XII. *November* 11.——The same dog was again bitten in the sound thigh. He remained for several hours in a half comatous state, and then recovered. He appeared more slightly affected than the day before, and the thigh had never been paralytic.

Experiment XIII. *March* 13, 1788.——A Rekula Poda, which had remained (without food) a captive for twelve days, bit a stout dog. In applying the snake, one of the fangs accidentally touched the scrotum, so as to fetch blood; the other slightly wounded the thigh. During the first hour, the dog discovered no symptoms of poison. In the second hour, the parts, especially the scrotum, were much swelled, but the leg was not, as usual, drawn up. In the course of the third hour, the dog became comatous; was unable to get on his legs; and the limb became paralytic. From this time, his disorder increased; he did not howl, but lay as if insensible, and his breathing was laborious. At the end of eight hours, he was found hardly breathing; yet he lingered two hours more, and died without convulsions.

The parts bitten were monstrously swelled.

Experiment XIV. *March* 26.——A dog, A. which had been bitten three days before, and in consequence of caustics applied to the part, had a running ulcer on the thigh, was bitten on the sound thigh by a Katuka Rekula of a dark brown colour, which had been caught only a few hours before, and was casting his skin. He had shed poison on the stick employed in catching him; so that none, for the purpose of insertion, could be procured by pressure on the ducts.

The bite was followed by no symptoms of poison; but as the dog had formerly been infected and recovered, he was, after an interval of two hours, bitten a second time, by another Katuka Rekula, in order to see how far his former recovery might render him unsusceptible. The usual symptoms appeared immediately after the bite; but the dog, after dozing for several hours, recovered.

Experiment XV.——A pig was bitten on the thigh by the dark coloured Katuka. The fangs remained in the skin half a minute, the pig squeaking loudly. As soon as he was let loose, he made so quick a retreat that it could not be determined, from the movement of the leg, whether he was infected. The only suspicious symptom was his slumbering for several hours.

Experiment XVI. *March* 29.——A second dog, B. (which had before been infected and recovered, and still

had ulcers in consequence of caustic,) was bitten this day, by the dark coloured Katuka; and again a second time, after an interval of two days; but both times without effect.

Experiment XVII. *March* 31, 1788.——The pig which had been slightly infected on the 26th, (Exp. XV.) was bitten by the light coloured snake. The fangs remained in the wound nearly half a minute. The pig, as before, squeaked vehemently, but became immediately quiet when let loose, and sunk down, as if seized with sudden debility. He made a large quantity of urine. In less than ten minutes, he suffered slight convulsions; after which he never attempted to rise, but at times showed great inquietude. It was five hours after the bite when he died.

Experiment XVIII. *April* 4.——The dogs A. and B. (Experiments XIV. and XVI.) were again bitten on the thigh, as also on the nose, but neither of the dogs were infected.

Observations.——The total failure in both the above instances, was imputed to some defect in the quality of the venom, for though the quantity emitted might not have been sufficient to kill, it might, at least, have been expected to produce some visible effect. A trial, therefore, was made on a subject that seldom escapes, however much the snake may happen to be exhausted by repeated exertions.

A chicken bitten on the thigh, immediately after the dogs, showed, in less than three minutes, manifest tokens of being infected, though the symptoms were slight, and disappeared in the evening.

Experiment XIX.——Another chicken was killed in five minutes, by the first bite of a snake which had reposed four days. The bird was instantly affected; in less than one minute it began to stagger, and in the next was seized with convulsions, which ceased only with life.

Experiment XX. *April* 7.——The dog A. (Exp. XIV. and XVIII.) being again bitten in the thigh, showed symptoms immediately of the poison having taken effect. In twenty-five minutes, he was so debilitated that he could not rise; he often moaned, and seemed to suffer greatly. At times, he lay comatous, and before the end of the first hour, became so ill as to be thought dying. Towards the end of the second hour, he appeared somewhat better. In the third hour, he ceased moaning, but refused food, and could not be made to rise. In this state he continued till night. The following day, he was pretty well recovered, and began to eat.

Observations.——The recovery in this case, considering the formidable symptoms which appeared so early, and the reduced state of the subject, was contrary to expectation.

Experiment XXI. The snake being left to rest half an hour, was made to bite the dog B. (Exp. XVI. and XVIII.) The leg was immediately drawn up, but in other respects the dog seemed nowise affected. After lying along for half an hour, he rose of himself, but was dull and stupified, and soon lay down again. After two hours, he was disposed to eat; and at night, appeared to be very well.

This was the last experiment made on this poor animal, which had been bitten six times; had the caustic applied twice; and had once had the poison inserted artificially. The ulcers from the caustic were at this time healing fast, and the dog recovered perfectly.

Experiment XXII. *April* 12.——The dog A. on which so many experiments had also been made, being now much reduced in strength, while an ulcer of enormous size in the thigh (partly the consequence of caustic, and partly of poison) showed less disposition to heal than to spread, it was determined to despatch him. With this view, one of two Katuka Rekula Podas, which had been for some time captive, but had not bit for several preceding days, was made to bite the breast of the dog; both fangs acted, yet no symptoms of disorder followed.

After waiting above an hour, another snake was applied to the thigh; which, owing to a sudden start of the dog, left a fang sticking in the wound: to make still more sure of liberating the dog, the snake was provoked to bite him once more with the remaining fang.

The dog instantly sunk; grew gradually worse, and expired within two hours after the first bite of the second snake.

Experiment XXIII. *January* 15.——A horse belonging to one of the gentlemen of the settlement, instead, as intended, of being shot, was, at my request, bitten by a Katuka Rekula, on each side of the nose. The bite

on the right side was complete, both fangs having visibly acted; on the left side, it was much slighter, the snake biting less fiercely.

In fifteen minutes, the right side of the nose appeared slightly swelled and discoloured, attended with a copious discharge from the nostrils. In twenty-five minutes, the swelling of the face, and about the throat, was increasing rapidly. Grass was offered; but the horse, being unable either to chew or to swallow, dropped it despondently from the mouth.

In forty minutes, the under-lip became convulsed, and continued so till night. The eyes and nose run excessively.

Through the second hour, the horse appeared more and more indisposed; the swelling continued to increase, especially that of the throat and under-lip; he still rejected food, but the breathing was not more affected than what seemed to be owing to the stoppage of the nostrils. At night, the swellings were still increasing.

Next morning, the horse was found much in the same state, still unable to eat or drink. The swellings, after an emollient fomentation, began to decline in the afternoon. At night, they were considerably diminished, and he eat a little.

The third day he continued mending; and in two days more was very well.

SECTION IV.

Experiments on the Poison of the Bedroo Pam. No. IX.

Experiment I. *October* 14, 1788.——He was first made to bite a chicken in the thigh, and both fangs acted visibly. The thigh almost instantaneously was drawn up, and the bird purged. In two minutes, it couched, and when put again on its legs, was found unable to stand. In five minutes, it was seized with convulsions, which increased in an uncommon degree, particularly in the head and neck. These ceasing in about two minutes, were succeeded by a stupor, in which the bird remained till its death, at the expiration of eight minutes.

Observations.——The symptoms of poison became so suddenly visible here, that I expected the bird would have died much sooner. The skin above the part bitten being removed, a blackish line was found to extend about an inch towards the groin, from which, on cutting into it, some black blood issued.

Experiment II.——A pig was bitten on the inside of the fore leg, without previously removing the hair. In seven minutes, she began visibly to droop, and, at the expiration of fifteen minutes, fell into a stupor, in which she continued to the end of the second hour; squeaking when roused, but unable to rise. In the course of the third hour, she seemed to grow worse, complained at intervals, but soon relapsed into stupor. In this state she remained nearly two hours more, when she appeared rather better, and soon after made shift to walk. At the end of six or seven hours, she was very well recovered.

Experiment III.——Half an hour after the pig, a second chicken was bitten, and, like the first, showed immediate symptoms of poison. Within three minutes it couched; but being forced to rise, it stood for a little while as if stupified, without attempting to walk, and soon couched again. At the end of fifteen minutes, the stupor remained; the neck seemed a little contracted, without any other appearance of spasm. Half an hour after the bite, the bird suffered slight convulsions, and soon fell again into the stupor; and in two or three minutes more, expired quietly.

Observation.——It is here remarkable, how slight the convulsions were, in comparison with the first case.

Experiment IV. *October* 20.——Six days after the above experiments, the snake having been permitted to rest, a dog was bitten on the inside of the thigh. During the first ten minutes, no signs whatever appeared of poison; but at the end of sixteen minutes, the dog, who sat half couched, was seized with a trembling of

the head and the fore legs. Being raised up, he walked a few paces without any apparent lameness. At the end of twenty minutes, the tremors increased, and the thigh was contracted. At the end of fifty-five minutes, the tremors became more universal, and the dog frequently stretched the neck, his mouth pointing upwards, as if gasping for breath; but he all along neither moaned, nor howled. During the second hour, he lay along on one side, either in a torpid state, or at intervals, writhing his limbs: and sometimes suffered a *subsultus tendinum*. After the third hour, he grew better, and soon recovered.

Experiment V.——A chicken bitten in the thigh, soon after the dog, stood nearly a minute as if stupified, then couched, and being put on its legs, walked a little way, but soon couched again. After five minutes, putting the point of its beak to the ground, it continued for two minutes, rocking the head incessantly sidewise: after which relapsing into a torpid state, it expired without more convulsion, in twenty-seven minutes from the bite.

Experiment VI.——After allowing the snake to rest one hour, a second chicken was bitten as in the last experiment: a little blood appeared on the thigh, but it was doubtful whether the fangs had acted. The chicken remained well.

Experiment VII.——A third chicken was bitten immediately after the second. The fangs visibly acted; but the chicken was not infected.

Experiment VIII. *October* 22, 1788.——Two days after the three foregoing experiments, the same dog which had escaped before, (See Exp. IV.) was bitten in both thighs. The legs were almost immediately affected, and within five minutes, the legs and breast were, as before, seized with tremors. The dog couched, but soon rose again; the trembling continued, attended with a slighter degree of stupor than the day before; and in the course of the first hour, the muscles of the wounded thigh were at times tremulous. The tremors decreased visibly in the second hour, the dog rose of himself, and stood firmly on his legs; after another hour, he had pretty well recovered.

Observations.——As the fangs acted on each thigh, and the dog was more slightly infected than in the former experiment, it was probable, though the snake appeared very alert, that the power of the poison must have been diminished. In order to try this,

Experiment IX.——A chicken was bitten in the thigh, and immediately showed signs of poison; but, after continuing two hours in a state of stupefaction, it recovered.

Experiment X.——After an interval of half an hour, a pigeon was bitten in the thigh. At first it escaped to a rafter in the room, whither being pursued, it got out, and rested on the top of a rock, at a little distance. It soon tumbled down from this last refuge, and was brought back; in about fifteen minutes from the bite. The bird seemed stupified, couched on the belly, and without convulsions, expired in that posture, three minutes after.

Experiment XI.——When the pigeon in the above experiment fled, a second was immediately bitten; and though the snake had bitten three times before, in the same forenoon, the symptoms of poison were instantly visible. After fourteen minutes, convulsions supervened, which alternated with stupor; and in forty-five minutes the bird expired; the convulsions having ceased for ten minutes before death.

The appearances about the wound, were found, upon dissection, the same as usual.

Observations.——From the foregoing experiments, the poison of the Bodroo Pam appears to be less deleterious, and slower in its operation, than those of the Cobra de Capello and the Katuka Rekula Poda: the symptoms attending it appear also to be in some respects different.

The first chicken was convulsed in an extraordinary manner, but lived eight minutes; the others were slightly convulsed, and lingered longer; some escaped altogether; but all suffered some degree of stupor. The dog and the pig escaped death, though both suffered considerably: especially the dog in Exp. IV. In Exp. VIII. the strength of the poison may be supposed to have been impaired by captivity and fasting; but its fatal effects on the pigeons, Exp. X. and XI. showed that it was not destroyed.

SECTION V.

Experiments on the Artificial Insertion of the Poison of Serpents, into the Bodies of Living Animals.

Experiment I. *October*, 1787.——On a dog, which some hours before had been bitten twice, by a Katuka Rekula Poda, without suffering any perceptible disorder, it was determined to try what might be the effect of the poison, when inserted into a wound. With this view, a small incision was made, where the skin was thinnest, on the inside of the thigh, and some threads imbued with recent poison, from the same snake, were laid into the wound, and secured by a bandage.

The operation was attended with no consequence; the wound suppurated, and the dog was well in a few days. The snake had been captive some time, and had two days before ineffectually bit two dogs; yet, that the poison fully retained its vigour was evident from the death of a chicken, in one minute and a quarter, which was bitten immediately after the operation on the dog.

Experiment II. *January* 2, 1788.——The skin of the inner part of the thigh, of a middle sized dog, being first divided, a small incision was made with an envenomed scalpel, through the *panniculus carnosus*, into which some recent poison, from a Cobra de Capello, (caught two days before,) was inserted on the edge of the scalpel, and threads soaked in the poison were applied also to the wound. The dog was secured in such a manner, as to prevent his reaching the part with his tongue.

The wound at first bled more than was intended, and, though the bleeding had ceased before applying the venom and the threads, some reddish serum continued to transude through the threads.

The dog, after half an hour, being let loose, began immediately to lick the wound, and the threads dropped off.

The wounded thigh caused a slight halt, but no other symptoms appeared of the poison having taken effect; and the dog, after a few hours, eat heartily.

The bleeding was suspected of having impeded the effect in this experiment; as the poison had been taken from a fresh and vigorous snake.

Experiment III. *March* 9.——An incision being first made through the skin, on the inside of the thigh of a stout dog, several small wounds were made into the parts beneath with a scalpel, dipped in the poison of a young Cumboo Nagoo, and poison was besides inserted into each wound. The skin of the other thigh was in like manner divided, and several punctures made into the subjacent parts, with an envenomed needle, charged repeatedly with fresh venom. The punctures were pretty deep, and some of them into the belly of the muscle.

The dog remained perfectly well, without the least appearance of being infected.

Experiment IV. *March* 23.——Of three drops of poison procured from two Katuka Rekula Podas, one half was inserted by means of a grooved hook, (made in imitation of the snake's fang,) into the muscle on both thighs of a stout dog: the skin having previously been divided. The dog when let loose, appeared to have lost the use of both legs: he drooped visibly, lay along, and moaned; and the parts about the wounds began to swell. Before night, the lameness was almost gone, and next day he was very well recovered.

Experiment V.——Some threads soaked in poison, procured from a Katuka Rekula Poda, (caught only four or five days before,) were passed in the manner of a seton, through the skin, near the groin of a slender dog, and the ends clipped off close to the apertures.

After a short time, both legs were affected, (though slightly,) as usual, where the poison takes effect; but no other symptoms supervened, and the dog was very well in a few hours.

Experiment VI. *March* 29.——Some days after, the poison of a Katuka Rekula was applied to another dog, exactly in the same manner, and with the same success.

The poison here, having stood till it appeared rather thick and glutinous, was, previously to insertion, diluted with two drops of rum, which did not seem to impede its effect.

Experiment VII. *April* 28, 1788.——For want of recent poison, some which had been taken several days before, from a Cumboo Nagoo, but was now become of a brittle gummy consistence, being previously moistened with water, was inserted into a small wound in the inside of the thigh of a stout dog. The dog remained well, without any suspicion of being infected.

Observations.——Though some slight symptoms in dogs, were produced by the artificial insertion of poison, it frequently failed altogether, and in no instance proved either mortal or formidable. The case was different with respect to birds; for though it frequently failed there also, it frequently produced some of the usual symptoms of poison, in a certain degree, and often death.

EXPERIMENTS ON BIRDS.

Experiment VIII. *March* 6.——Recent poison from a Cumboo Nagoo, was inserted into the thigh of a chicken, without producing any disorder. At the distance of three days, some of the same poison, now become dry, was inserted into the other thigh, after being moistened, but produced only a little swelling about the part.

Experiment IX.——At the distance of six hours, the same chicken was bitten by the Cumboo Nagoo, which had bit a dog just before. The bird was seized with convulsions, and expired in less than four minutes.

Experiment X.——Some recent poison taken from the Cumboo, was inserted into the thigh of a chicken, but produced no other effects than a little discoloration, and swelling of the part.

Experiment XI.——The day following, part of the same poison used in the last experiment, (being previously moistened,) was applied to both thighs of a chicken; to one, by an incision made with an envenomed scalpel, besides rubbing poison repeatedly on the wound: to the other, by repeated punctures of a needle armed with poison. The event was the same as in Exp. X.

Experiment XII. *March* 12.——A chicken, to which poison had been applied at two different times, with little or no effect, being bitten by a very young Cobra de Capello, (not eight inches long,) expired in eleven minutes.

Experiment XIII. *March* 23.——Some poison of a Katuka Rekula Poda, shed on a stick in endeavouring to make him bite a dog, was inserted into the thighs of two chickens, by simple incision; but in neither had any effect. The snake had been captive five or six days.

After three hours, to the same chickens was applied some poison from a Katuka fresh caught, and very fierce. In one, it was inserted by puncture; in the other, by threads, in the manner of a seton: but in both without any more effect than in Exp. X. A pigeon, at the same time, was treated in the same way as the first chicken, and escaped in like manner.

Experiment XIV. *March* 24.——In preparing the Katuka Rekula Poda this morning, he snapped at the stick, and left one of his fangs on it, in the midst of the poison he had emitted. The fang, moistened as it was with poison, being instantly plunged into the thigh of a pigeon, was left for some time in the puncture, from which little or no blood issued. The part swelled, and the legs seemed slightly affected, but no other symptoms supervened.

Experiment XV. *March* 26.——Some dried poison of the Cumboo Nagoo, which had been kept a fortnight, was moistened with a few drops of rum, and inserted into the thigh of a chicken; without any other consequence, than the part swelling, and becoming livid.

Experiment XVI.——The skin of the thigh of a pigeon being first divided, the fibres of the bare muscle were cut transversely with an envenomed lancet, and poison was also carefully inserted.

It was one hour before any effect was observed. The bird then drooped, and would not eat; but continuing to walk about, (only roosting at intervals,) it was considered as out of danger. At the end of seven hours, however, it was found dead.

The wound remained open and dry, and there was little or no swelling.

Experiment XVII. *March* 29, 1788.——Some poison taken from a Katuka Rekula Poda, was applied to two pigeons; to the breast of one, by puncture; to the thigh of the other, by dividing the fibres of the muscle in the same manner as in Exp. XVI.; neither of them showed any symptoms of poison.

Another portion of the poison, having become thickish, was thinned with some drops of rum, and applied to two chickens; to one in the thigh, to the other in the breast; but to both without effect.

A hook, in the shape of a fang, was employed here instead of a lancet, and was plunged pretty deep into the flesh.

Experiment XVIII. *March* 30.——Recent poison of a Katuka, was applied to one chicken in the neck, and to another in the thigh; and in both was carefully inserted into the bare muscles. Neither of the birds were infected.

Two other chickens had the poison inserted by the hook; but equally without effect.

Experiment XIX. *April* 13.——Some poison from a Katuka Rekula Poda, (which had been kept captive and fasting for a month,) was inserted into the breast of a chicken, by twice or thrice pricking the belly of each pectoral muscle, with the hook, charged each time with fresh venom.

While the operation was performing, the bird vomited; and when set down on the ground, stood motionless, as if stupified, for nearly half a minute; it then staggered, and, before the expiration of the minute, fell down: violent convulsions succeeded, which continued with little intermission, till little more than three minutes after the operation, when the bird died.

Another chicken, treated exactly in the same manner, expired in about three minutes and a half. It did not vomit when set down, but purged; it appeared less stupified, and walked about during the first minute: it then staggered, and suffered convulsions, as in the preceding experiment.

Experiment XX.——In waiting for another subject, the poison had acquired a thicker consistence, and being inserted into a chicken, as in the two foregoing experiments, produced only very slight symptoms, from which the bird recovered.

Another chicken, to which the poison, a little diluted, was applied in the same manner, was not visibly affected.

Experiment XXI. *April* 16.——The poison of another Katuka, applied by the hook to two places of the pectoral muscle of a chicken, produced no other effect than a little swelling, and discoloration of the part.

Experiment XXII.——Into the biceps muscle of another chicken, some of the same poison (now somewhat thickened) was very carefully inserted, by repeated punctures.

As soon as set down, the chicken purged, but walked about seemingly well, for nearly a minute. It then began to stagger, lay down, and suffering only very slight convulsions, expired in about three minutes and a half from the operation.

Observations.——I had suspected, that the failure in some of the foregoing experiments, might be owing to the poison having lost part of its power, by exposure to the air; or to its soon becoming much thicker in consistence than when first emitted. But in Exp. XXI. where a local effect only took place, the poison was thin and recent; whereas in Exp. XXII. where the poison had been some time exposed, and was grown glutinous, the chicken was killed.

Experiment XXIII.——The chicken employed in Exp. XXI. continuing to walk about, in appearance perfectly well, poison was inserted a second time, but in the biceps muscle, as in Exp. XXII. The poison had been taken from a Katuka of a lighter colour than the former, but was become glutinous from exposure. No alteration was perceived for the first minute. The bird then purged, and instead of walking about as before, retired into a corner, and stood as if stupified; soon after which, it lay down, and violent convulsions supervening, it expired in somewhat less than four minutes.

Experiment XXIV.——Some poison from the same snake, but in a fluid state, (instantly after emission,)

was inserted into two parts of the biceps muscle of each pinion of a pigeon. The bird continued lively and well for ten minutes: it then retired into a corner, and visibly drooped; but did not seem stupified, and it pecked at a chicken which approached too near it. At the end of an hour, the parts about the punctures were swelled, and extravasated blood appeared under the skin. It remained another hour in a torpid state, without stirring, and expired in two hours and a half after the operation, having suffered only slight convulsions before death.

OBSERVATIONS.——Though recent poison was employed here, on a subject of all others the most easily infected, yet the pigeon lingered two hours and a half; while the chicken to which the poison, after being kept an hour, was applied exactly in the same manner, survived only four minutes.

Experiment XXV.——The skin of the pinion of another pigeon being first divided, a small incision with a lancet, was made in two places of the biceps muscle, into which was carefully inserted some poison from a different Katuka.

The bird, as in the former experiment, walked about for ten minutes, and then drooped, (though in a less degree,) and retired into a corner: she remained evidently disordered, for an hour and a half, recovering, however, sufficiently at intervals, to walk about and pick up grains. At the end of two hours the parts were much swelled, and discoloured. The next day the bird was very well, the swelling and discoloration only remaining.

OBSERVATIONS.——Here the poison was inserted into one pinion only, but into two incisions, and in quantity deemed fully sufficient. Perhaps the bleeding of the incisions prevented the complete admission of the poison.

Experiment XXVI. *May* 19.——Into the pectoral muscles of a chicken, two drops of poison, which a Katuka had shed in biting a stick, were inserted; in one muscle with the hook, in the other with a lancet. The parts swelled, and became somewhat livid, without any further consequence.

The poison employed in the two following experiments was taken from a Cobra de Capello.

Experiment XXVII. *August* 14.——The pinion of a chicken being partially cleared of the feathers, a part close to a pretty large vein, was slightly abraded with a file, so as to remove the epidermis, but without starting any blood; one drop of poison was then well rubbed into the part.

For several minutes, the bird showed no signs of being infected, and only retired into a corner; but in a quarter of an hour it seemed to be somewhat stupified. In five minutes more, it fell down, the head drawn towards the breast. Slight convulsions soon supervened, which returned at intervals, till forty-six minutes after the operation, when the chicken expired.

A second chicken treated by the file in like manner, had some scratches made besides in the skin, after the application of the poison, but so superficial as not to fetch blood.

The experiment proved fatal; the approaches of death were also equally slow, and the symptoms exactly the same as in the preceding experiment.

OBSERVATIONS.——It may be remarked, that in this mode of applying the poison by abrasion, the local swelling and discoloration were much less than in any of the other modes.

Experiment XXVIII. *December* 17.——The recent poison of a Cobra de Capello applied to the pinion of a chicken, in the manner last described, produced no visible effect for twenty minutes. The bird then began to droop; at the expiration of half an hour, it appeared much disordered, and after suffering convulsions as usual, died in one hour and ten minutes.

Experiment XXIX.——Another chicken had the same poison applied with a hook to the same part of the pinion; but the poison, (little in quantity,) having stood till thickened, and no symptoms of disorder appearing for one hour, the experiment was conceived to have failed.

At the end of the first hour, however, the usual symptoms supervened; at the expiration of the second hour, the bird lay on one side, as if dying; yet lingered one hour longer.

Experiment XXX.——The poison of a Katuka Rekula Poda applied, by abrasion, to the pinion of one pigeon; and with the hook, to the pinion of another, produced no symptoms of poison whatever.

OBSERVATIONS.——It may be remarked in general, that in the first five or six experiments on birds, the poison was inserted into the thigh; either a lancet or a needle being employed for the operation: in the succeeding experiments, the operation was variously performed, and in various parts. In the first twenty instances, the operation proved fatal only once; (Exp. XVI.) though in most of them the poison produced some local affection, as swelling and discoloration about the incisions.

In both instances, (Exp. XIX.) where the experiments succeeded completely, the poison was inserted into the belly of the pectoral muscles, by the hook; whereas in most of the former experiments, the thigh was the usual place of insertion, and a lancet, or a scalpel, was the instrument used: but in Exp. XVII. and XVIII. the same mode of operating had failed; and afterwards in three instances, had either been equally unsuccessful, or produced only local symptoms. (See Exp. XIX. XX. XXVI.)

As to the place of insertion, there seemed to be little difference between the pectoral and biceps muscles; both appeared, in birds, to be preferable to the inside of the thigh; at least no instance, where the operation was performed in the thigh only, proved fatal.

I suspected that the constant failure in the first experiments might have sometimes been imputed to the bleeding of the incision, which, though for the most part very inconsiderable, might have been sufficient to impede the absorption of the poison, and particularly where the muscles were laid bare. Various experiments in the sequel contradicted this conjecture; which, however, led me at first to try the simple abrasion of the skin. See Exp. XXVII. XXVIII. XXIX.

The mode, by abrasion, seemed, from the few trials made of it, less uncertain of taking effect, than some of the others which were more operose; but the poison was much slower in its operation, than in Exp. XIX.

SECTION VI.

Experiments on Remedies, applied against the Poison of venomous Serpents.

In many cases where the poison is applied to brute animals, its progress is so extremely rapid, as hardly to leave time for the operation of a medicine, or the application of any means whatever, with a probability of success. Where its progress is slower, should the remedy be administered before unequivocal symptoms have removed all doubt of the poison having taken effect, recovery may be ascribed to the medicine given, when, in reality, no malady existed; and if deferred till doubts are removed, the remedy which, if applied in time, might have proved efficacious, may come to be unjustly proscribed as useless. To this it may be added, that a bite of the most pernicious snake does not constantly prove fatal; and that even the tenderer animals, sometimes without the use of remedies, recover, in instances where the symptoms were very formidable.

Similar difficulties in estimating the efficacy of medicines occur, in some degree, in many diseases; but belong in a more peculiar manner to animal poisons. A multitude of repeated experiments, only can justify general inferences; and in transferring such inferences to the human subject, analogical reasoning should be exercised with the most scrupulous caution.

From the experiments detailed in the foregoing sections, it sufficiently appears, that the several poisons mentioned, though in different degrees, are all deleterious

That the symptoms produced by them in the bodies of different animals are very much alike.

That the progress of these symptoms after they commence, is nearly in the same order of progression, though in different degrees of rapidity.

That a like variation is observed in the commencement of the symptoms. Sometimes it is almost instantaneous; in general from three to ten minutes; but very seldom later than half an hour.

That when the snake is first caught, its bite infects with more certainty than when kept some time: but the deleterious quality of the poison, though impaired, is not by captivity (even where accompanied by long fasting)

destroyed. When it appears to have lost the power of killing larger quadrupeds, it still retains that of killing birds, though less speedily than at first.

That when the snake is made to bite several times successively in the same day, the first bite, other circumstances being equal, is not only more certain of infecting, but in general proves more quickly deleterious.

That the poison of snakes does not invariably kill animals; and that they sometimes unexpectedly escape from a concourse of dangerous symptoms; though in general the danger of death is in proportion to the violence, and early appearance, of these symptoms.

That the period of death varies considerably. Dogs, in no instance, were killed in so short a time as birds: but the variation, with respect to both, so far as my experiments go, does not seem strictly correspondent to the size of the animals.

That the artificial insertion of poison is less secure of taking effect than the bite of the animal; but the consequent symptoms are exactly the same, and the event, with respect to the smaller animals, not less fatal. For the trial of remedies, however, the bite of the reptile itself was always preferred to the artificial insertion of the poison.

Several of the above inferences will be found of service to prevent certain effects, whether good or bad, from being ascribed erroneously to medicines, which properly belong to the disease in its natural course.

On the poisons of the rattle snake and the viper, great pains have been bestowed, and much has been written; but concerning the Cobra de Capello and the Katuka Rekula Poda, to which the few following experiments solely relate, I have neither been able to avail myself of the prior labours of others, nor to collect much auxiliary information in India, which was not vague and imperfect. The little, therefore, I had it in my power to execute, and which is produced in the present Section, is to be considered merely as the commencement of a plan of investigation; which it is hoped will hereafter be more extensively and successfully prosecuted in India, where the object in view is more peculiarly interesting, and where subjects for experiment are easily procured.

A multitude of experiments, made in Europe, on the poison of the viper, having sufficiently confirmed the inefficacy of the most celebrated internal remedies, usually recommended against venomous bites, I was induced to give the preference for trial to an Indian remedy, sanctioned by unquestionable authority, as much used with perfect safety, and often with success. This was the Tanjore pill; of the composition of which, as a more particular account is reserved for another place, it need only be observed here, that white arsenic is a principal ingredient; and that each pill of six grains, was supposed to contain somewhat less than three fourths of a grain of arsenic.

Experiment I. *July*, 1787.——A small dog was made to swallow a Tanjore pill, and, immediately after, was bitten in the thigh by a Cobra de Capello; the half of another pill, dissolved, was rubbed on the punctures. Instantly on swallowing the medicine, and before the snake had touched the thigh, the dog discharged a quantity of saliva.

The discharge continued about ten minutes; but no symptoms of disorder appeared till towards the end of the first hour, when the dog howled, panted as he lay along, and suffered slight convulsions. In this state, a second pill was given, which excited the saliva as before, without any other evacuation. After dozing, as if comatous, for some time, the dog began to recover; and, at the end of four hours, was very well.

Observations.——The first circumstance to be remarked here is, that the two pills produced no other evacuation than from the salivary glands, nor seemed to affect either the stomach or the bowels.

The recovery, in appearance, was rather in favour of the medicine: but another dog, which had just before been bitten by the same snake, had recovered equally well from bad symptoms, without the aid of medicine; and two chickens, bitten after the second dog, though both died, yet lingered unusually; the one an hour and a half, the other two hours. All that could here be safely concluded was, that two pills had produced no violent effects.

Experiment II. *October* 17, 1787.——A Katuka Rekula Poda, which had just before killed a chicken and two dogs, bit a rabbit on the shoulder, the fur having been previously plucked off. Half a pill was given immediately after the bite, and the other half was rubbed on the punctures. No flux of saliva followed.

The leg became paralytic in ten minutes, but the animal continued to move about, and to lie down, alternately. After forty minutes, it grew torpid, drowzy, and was hardly able to move. Convulsions succeeded, and the rabbit expired: an hour and a half after the bite.

Experiment III.——The day following, a slender dog was bitten by the same snake, and a pill was attempted to be given, but not more than one half was swallowed. Nothing was applied to the part. There was no discharge of saliva.

The dog frequently licked the punctures, when let loose. In seven minutes, the leg was drawn up; in seven more, he seemed much disordered, and lay down. In twenty minutes, the limb was paralytic; through most of the second hour he was heavy and much disposed to doze. After three hours, he fed heartily, and next day was very well; though he had not entirely recovered the use of his limb.

Experiment IV. *April* 24, 1788.——Having received some fresh pills from Tanjore, it was judged proper, previously to recommencing experiments on infected dogs, to make trial on a healthy subject, in order the better to discriminate their effects, from the symptoms of poison.

One pill, weighing nearly seven grains, rubbed down and mixed with water, was given to a slender bitch, and as she was properly secured, the whole dose reached the stomach. The throat was evidently affected by the medicine; for the bitch continued, for a quarter of an hour, with her mouth open, panting, drawing in the fresh air, and working her jaws and throat, as if expressing and swallowing the saliva; the mouth of the stomach was next affected, with a rising, without retching, or vomiting. All this time, the animal expressed much inquietude, rolling frequently on the ground, and breathing quick; it refused water, and reluctantly stood up. After half an hour she vomited, and in the course of another half hour, she vomited twice more. This was followed by a copious bilious stool, after which she became much quieter, and in two or three hours more was very well.

Observation.——The medicine produced no discharge of saliva, as in Exp. I. the secretion was indeed increased, but the spittle was swallowed as fast as it came into the mouth.

Experiment V. *April* 25.——The bitch, mentioned in the preceding experiment, was again bitten on both thighs, by a Katuka Rekula Poda. The snake bit fiercely, the bitch seemed to suffer much pain, and urined copiously.

When let loose, she seemed to be relaxed universally, and sunk down, the hind legs were completely paralytic, she lay along, unable to raise the head, while the mastoide and other muscles about the throat, were convulsed to such a degree as drew the head down to the breast: a circumstance never observed before, nor had I ever observed so instantaneous an appearance of alarming symptoms.

In this desperate state, it was thought fruitless to try any remedy; but a pill being already broken and mixed with a spoonful of boiled rice, it was given, and washed down with a little water, five minutes after the bite.

Neither a discharge of saliva, a burning in the throat, nor retching were observed: yet the convulsion of the neck continued, and the limbs remained paralytic.

Half an hour elapsed without any sensible effect of the pill, but the animal seemed more depressed, and the convulsive motions of the neck were more feeble. In fifty minutes from the bite, the bitch expired, not in convulsions, but by a gradual sinking.

Observations.——The present case I conceived to be one of those, in which the poison acts so rapidly, as to leave no time for the effectual operation of any remedy. That the pill did not operate in half an hour, might perhaps have been owing to the defect of sensibility in the system: to which also, as well as to the mode of giving the medicine, might be ascribed the absence of the burning in the throat, remarked in the preceding experiment.

Experiment VI. *May* 12, 1788.——In a dog bitten twice on the thigh by a Katuka Rekula Poda, the leg was immediately drawn up; he urined, and, after a stool, lay down. After four minutes, being forced to rise, he staggered a few paces, and then slid down, as if paralytic in all his limbs.

The rapid progress of the symptoms, left little hope of benefit from any internal remedy; however, he was taken up as soon as possible, and his contracted jaws being with difficulty opened, one pill, mixed with water, was forced into the stomach, in about five minutes after the bite. There was no discharge of saliva; but, in about fifty minutes after swallowing the pill, he had a bilious stool.

At the end of the first hour, he sometimes raised his head, but his jaws were close shut; he refused water, and was unable to stand. In a quarter of an hour more, half a second pill was forced down his throat.

He remained in this state for another hour, and then expired, without convulsions. The thigh was livid, and much swelled.

Observations.——A discharge by urine or stool, immediately after the bite, denotes, in general, that the poison has taken effect. So early a contraction of the jaw is not common.

Experiment VII. *May* 18.——A dog was bitten, as in the last experiment, by another snake of the same species. The leg, in like manner, was instantly drawn up; and in two minutes, the other hind leg also became paralytic: the dog urined, had a stool, and then laid himself along. At the end of six minutes, the jaws not being contracted, one pill was given with ease. There was no discharge of saliva; but the same kind of movement was remarked at the mouth of the stomach, as in Exp. IV.

Ten minutes after the medicine was given, the dog howled and moaned dreadfully, made several ineffectual attempts to rise, but being deprived of the use of the hind legs, he could not stand when helped up. For half an hour he continued alternately quiet and restless, and then took a second pill, which occasioned more commotion of the stomach than the first, though neither vomiting nor purging. The next half hour was chiefly passed in dozing, he howled less, suffered no convulsions; and expired in one hour and ten minutes after the bite.

Observations.——Here again the progress of the poison was extremely rapid, and the most dangerous symptoms had made their appearance before the medicine was given.

It should be also remarked, that the snakes employed in the last two experiments, had been captives two months and ten days, during which time, each had only swallowed four eggs, and had absolutely eat nothing for the preceding forty days.

Experiment VIII. *October* 30.——To a dog bitten twice in the thigh by a Cobra de Capello, a pill and a half was given within two minutes after. No symptoms were observed of the poison having taken effect. The effects, however, of the medicine were very visible, viz. the rising at the stomach, labouring of the flanks, and sickness.

After twenty-two minutes, the movement of the flanks diminished, the dog vomited, and attempted a stool. In the next half hour, he vomited twice, and purged once. The leg was never drawn up; he sometimes lay down, but could walk about; and, in the evening was very well.

Experiment IX. *November* 26.——Half a pill, pounded and mixed with crumb of bread, was given to a chicken, and washed down with a little water. Ten minutes after, a Cobra de Capello was made to bite her on the thigh, which was drawn up, as usual, when infected. In five minutes she purged, drooped, and couched. In five minutes more, the head was convulsively drawn towards the breast, and she sometimes rested her beak on the ground. In thirty minutes, after several loose stools, the bird lay down on one side, convulsions succeeded, and she died: forty-five minutes after the medicine.

Observations.——The loose stools were the effect of the medicine; for symptomatic stools, where no medicine has been given, are in general consistent, not loose.

Experiment X.——The same dose was given to a second chicken; it continued, for three or four minutes, to pick up crumbs as before, after which it seemed to loath them. In ten minutes after the medicine, it was bitten by the same snake: in fifteen minutes, couched, and had one or two loose stools; at the end of twenty-five minutes, it still remained couched, the head reclined; and in ten minutes more, the leg and thigh trembled

excessively. When raised up, the bird stood stupified, was unable to walk, and soon couched again. In the course of the next two hours, it purged twice. After which, gradually growing worse, it expired at the end of the seventh hour.

Observations.——In the two last experiments, the medicine operated by stool; and the operation in both coincided with the first effects of the poison, that is, within five minutes after the bite. Perhaps death was somewhat retarded by the medicine in the last chicken, which lingered seven hours.

Experiment XI. *January* 3, 1788.——A Cobra de Capello, immediately after having bit a dog mortally, was made to bite a stout young bitch in the thigh. The thigh became instantly paralytic. An iron having been previously prepared, the punctures were well cauterized, within three minutes after the bite. The bitch lay down after the operation, and when obliged to rise, walked on three legs, more lame than before, probably from the pain of the burning, for no other symptoms of poison supervened. Two hours after the operation, she eat heartily; but soon threw up all she had eat. At the end of ten hours, she was very well.

The above is the substance of Mr. Briggs's account, who had been so obliging as to make the experiment at my request.

Experiment XII. *March* 12.——A Katuka Rekula Poda, which had been captive only three days, was made to bite a stout dog on the inside of the thigh. Symptoms of the poison having taken effect were soon evident, the punctures were very visible, and the parts around were swelling fast.

Fifteen minutes after the bite, the parts were cauterized. The dog howled as if from pain, and the other symptoms increased. At the end of the hour, he vomited, rose up with difficulty, staggered when on his legs, and continued at intervals to howl. He died at the end of two hours and a quarter; and though, for the last hour, he suffered a few slight convulsions, he lay mostly in a torpid state.

Experiment XIII.——In about ten minutes after the last experiment, the same snake was made to bite a slender dog. Both fangs acted, and were permitted to remain ten seconds in the skin. Unequivocal signs of poison followed, and were deemed of the most dangerous kind.

After an hour had elapsed, the cautery was applied to both punctures, and the parts were embrocated with oil; the dog, however, continued to howl for half an hour. The usual symptoms of poison rather increased in the second hour; after which, the dog began to recover, and at the end of five hours fed heartily.

Observations.——This was the second bite of the snake, and therefore less dangerous than the first; but the case was attended with threatening symptoms; and, notwithstanding the long delay, the cautery possibly was of some service.

On a supposition that the hot iron is applied too late to prevent completely the absorption of the poison, may it not, as a powerful stimulus, operate in counteracting its effects?

However that may be, it seems highly probable that the cautery, when properly applied, and in due time, may be of material service, though not an infallible remedy. But as it requires some time in preparing, and carries an appearance of terror to persons not accustomed to such operations, I was induced to make trial of an application, less dreadful, less painful, and the materials of which might be kept more readily at hand. This was opposite caustics, in the manner I recollected having seen applied to certain tumours and excrescences.*

As the toughness of the dog's skin seemed to impede the action of the caustic, an incision was sometimes made on the punctures of the fangs; and, in order to prevent burning the tongue, it was necessary to secure the dog for some time, so as he could not lick the wound; an embrocation of oil also was generally used.†

* Edinburgh Medical Essays, Vol. IV.

† I was at that time unacquainted with the Abbé Fontana's curious experiments contained in the second volume of his valuable and elaborate work on the Poison of Vipers.

It has been very well observed by Dr. J. Hunter, (speaking of the bite of the mad dog,) "that caustics may be admissible in some cases, where the knife "cannot be used; and though they have failed in certain instances, yet that was probably owing to their not having been applied to all the infected surfaces. It would appear, however, that the best caustic has not been used, which is probably the caustic vegetable alkali, in a solid form, the *kali purum* "of the London Pharmacopœia; both as it acts more speedily, and also more completely destroys and dissolves all animal substances. By applying it to "the various surfaces of the wound, and immediately removing with a spatula the parts upon which it has acted and dissolved, it may again be applied, "and the part destroyed to what depth may be deemed necessary: the surgeon seeing all the time the extent to which the caustic goes." Transactions of a Society for the improvement of medical and chirurgical knowledge. Lond. 1793.

Experiment XIV. *March* 17, 1788.——A dog was bitten by a Katuka Rekula Poda; but the bite seeming slight, he was bitten a second time, and four punctures were then visible on the skin.

The dog complained very little; but when let loose, he sunk down on the ground, unable to stand, or rise. No doubt remaining of his being infected, as soon as a quarter of an hour had elapsed, a drop of oil of vitriol was applied to each of the scarified punctures, and immediately after, (having no common caustic) oil of tartar thickened with a little quick lime, was applied. The application being repeated more than once, the dog complained much more than from the bite, but soon became quiet. In half an hour he was seemingly much disordered, and his breathing very laborious. At the end of four hours, convulsions supervened, which returned at intervals for an hour more, till his death.

Experiment XV.——A second dog was treated exactly in the same manner. Symptoms of poison soon appeared, and increased after the caustics were applied. This dog also suffered much from the caustic; and the application of sweet oil to the wound having accidentally been omitted, he howled horribly upon licking the thigh.

In about forty minutes, his breathing became laborious, and he seemed dangerously ill; in which state he remained nearly an hour and a half. In the evening he began to recover, and next day was very well.

Experiment XVI. *March* 23.——A Katuka Rekula Poda which had just bit a dog mortally, was made to bite a second dog in the thigh. The part swelled immediately; in ten minutes it became blackish, and the whole limb trembled in a remarkable manner.

After a quarter of an hour, the caustics were applied to the bare muscle, as well as to the lips of the incision; and the pain seemed to be mitigated by the oil of tartar. The dog appeared to be universally relaxed, and lay for two or three hours in a comatous state: after which he gradually recovered, and, the sore on the thigh excepted, was very well the day following.

Experiment XVII. *March* 24.——A dog bitten by another Katuka Rekula, soon showed very dangerous symptoms of poison. The caustics were not applied till after eighteen minutes. The dog howled dismally; showed extreme disquietude; and, without suffering convulsions, expired within the hour.

Observation.——In this case I conceive the progress of the poison to have been too rapid for the effectual application of any remedy: yet I regretted not having sooner used the caustics.

Experiment XVIII.——A much stouter dog was next bitten by the same snake, and the caustics applied in fifteen minutes, yet not till after the part had swelled, accompanied with other symptoms of the poison having taken effect. The pain from the caustic was visibly allayed by the oil of tartar.

He lay in almost a continual doze for two hours; or, when roused, seemed sickish, and refused victuals. In the third hour, he grew more unquiet, howled frequently, and the leg remained drawn up. After dozing two hours more, he began to recover, and at night eat with appetite.

Experiment XIX. *March* 26.——The dog in the preceding experiment being well recovered, the ulcer excepted, was bitten in the other thigh by the same snake, and the symptoms of poison advanced so rapidly, that the caustic was applied within eight minutes after the bite.

The dog suffered less pain than from the former operation; and, after slumbering two or three hours, recovered.

Experiment XX.——A dog, which three days before had been infected by poison, applied in the manner of a seton (see Sect. V. Exp. V.) was bitten in the opposite thigh by a Katuka Rekula Poda. The snake bit fiercely; and the dog almost instantly appeared to be infected.

The caustic was applied in four minutes; but the dog, as soon as let loose, staggered, sunk down, and in a few minutes more appeared to be dying. After this he remained comatous for two hours; unable to rise when urged, and only now and then lifting his head with difficulty half up. At the end of four hours and a half, he expired, without convulsion.

Experiment XXI. *May* 27.——A small dog, bitten two days before by a Katuka Rekula Poda, but not infected, was bitten again this day on the other thigh. In two minutes, both hinder legs were affected; and

in five minutes, the incisions were made, and caustics applied. The dog hardly complained, he urined and had a stool, during the operation; and when taken from the table, his limbs were found completely relaxed: he slid down, and lay along in a state of insensibility, without moving or complaining. In forty minutes, he was convulsed about the throat, and had a hiccup, which returned at short intervals, till his death: fifty minutes after the bite.

OBSERVATIONS.——Though the caustics were applied in five minutes, the most alarming symptoms of poison had already made their appearance. The making no complaint when the caustics were applied, and total silence afterwards, showed a singular insensibility.

Upon dissection, the membranes under the skin round the punctures, were found considerably inflamed; and under the principal puncture, were become black, and covered with grumous blood: the blackness had even penetrated nearly half an inch into the subjacent muscle.

I should have ascribed the blackness to the caustics, but under another puncture to which they also had been applied, the membranes were only shrivelled, and superficially discoloured.

In the thigh bitten two days before, the membranes were found slightly inflamed, not black. The thoracic and abdominal viscera were sound. The blood contained in the auricle, and large veins near the heart, appeared less grumous, and of a darker colour than usual: when exposed in a vessel, it also seemed to coagulate more slowly, while the crassamentum was less tough. But not having examined, in that climate, the blood of a dog not infected, I am in doubt how far the appearances in the thorax should be ascribed to poison.

Experiment XXII. *September* 12, 1788.——A very stout dog was bitten by a Cobra de Capello, on the inside of the thigh, and the symptoms of poison were visible in a few minutes. In seven minutes the caustics were applied; but alarming symptoms advanced rapidly; both hinder legs were paralytic, and the head was convulsed most remarkably. He expired in two hours after the bite.

OBSERVATIONS.——In this case, the stronger common caustic, (which I had received from Madras,) was employed instead of oil of tartar, and was applied before the vitriolic acid. But though the caustic was almost liquid, it made very little impression on the skin, which was more quickly and sensibly affected by the vitriolic acid; on which account it seemed better to apply the vitriol first, and to use the caustic in the same manner as the oil of tartar. Scarification, in some degree, should perhaps precede the caustics.

Experiment XXIII. *September* 12.——To a chicken bitten in the pinion, by a young Cobra de Capello, the caustic was first applied, (without scarification,) and then the oil of vitriol. In about forty minutes it was slightly convulsed, and died in one hour eight minutes, after the bite. To another chicken oil of vitriol alone was applied, in five minutes after the bite, the part having first been slightly scarified. Convulsions came on in less than fifteen minutes, and the bird expired in twenty-three minutes.

Experiment XXIV. *September* 19.——A stout dog bitten on the thigh by a Cobra de Capello, appeared at first to be very slightly infected. In half an hour the part, which had swelled a little, was pretty deeply scarified, and the oil of vitriol applied alone, which seemingly gave much pain. The dog continued mostly on his legs, for an hour and a half. In half an hour more, he was seized with convulsions, particularly about the head and the throat, and expired at the end of three hours.

OBSERVATIONS.——The symptoms in this case were at first so slight, that had the dog recovered, I should have doubted his being infected.

Experiment XXV. *September* 30.——To another stout dog, which appeared to be very slightly infected, the oil of vitriol was in like manner applied, immediately after the bite. The application caused great pain; and the dog expired in one hour and forty-eight minutes. (See Exp. IV. Sect. II.)

Experiment XXVI.——The thigh of a chicken bitten by a very alert Cobra de Capello, was immediately scarified, and had oil of vitriol applied to it. No symptoms of poison followed.

Another chicken bitten immediately after by the same snake, escaped equally well, though no remedy was used.

OBSERVATIONS.——The first bite of a Cobra de Capello generally proves fatal to chickens, especially where the snake is alert, as in the present case: the second chicken, it is true, was bitten less fiercely, but its escape was also remarkable.

Experiment XXVII. *October* 30, 1788.——A chicken was bitten on the thigh by a Cobra de Capello. One fang at least had acted, and poison remained on the skin, where the holders had left visible marks. After two minutes, the part, without scarification, was washed with the vitriolic acid, a little diluted. The bird was not infected.

OBSERVATIONS.——When trial was made of the caustics, it was not from any notion of their acting immediately upon the poison by an acid, alkaline, or neutral quality, but rather as preventing its absorption, in the manner of the actual cautery, by destroying the vascular texture of the parts. From the small number of experiments made, it would be rash to draw general conclusions; but on comparing the various results, it sufficiently appears that the remedy often failed, though applied from four to fifteen minutes after the bite; that it almost invariably failed when applied later; and that where the infected subject escaped with life, a much greater number of trials would still be required for ascertaining the merit to be ascribed to the caustics.

Like the actual cautery, they require to be applied early; and the application of both to certain parts would be liable to similar objections. That is, the risk of irreparable injury to a limb, which ought not to be incurred, unless where life itself is visibly in danger: a point in many cases not easily determined from the concomitant symptoms, at the beginning, or before the poison has made considerable progress.

This last objection applies also to amputation, which has been found an effectual remedy in respect to young guinea pigs, where the operation was performed within five or six minutes after the bite of the viper.* A few experiments of amputation which I made on chickens and pigeons, proved unsuccessful: but perhaps the operation was too long deferred.

Experiment XXVIII.——A Cobra de Capello, after biting a dog twice, was made to bite a pigeon on the lower part of the thigh, and in one minute, the limb was cut off a little above the punctures. A good deal of blood was lost.

The bird survived two hours, remaining for the most part couched and drooping; but for one minute before death, it suffered violent convulsions.

Upon dissecting the amputated limb, it was found that the discoloration of the muscle extended nearly half an inch above the punctures, reaching almost to the place of amputation.

Experiment XXIX.——A ligature applied immediately, to dogs, after being bitten in the leg by a Cobra de Capello, failed in preventing the progress of the poison, in the few trials I had an opportunity of making; but the trials were too few to establish the inutility of the practice.†

OBSERVATIONS.——Suction of the infected wound, and the application of leeches, I never tried; but their inutility in Europe, in the viper poison, seems by experiments to be placed beyond doubt. ‡

Experiment XXX. *December* 17.——To the thigh of a chicken, bitten by a Cobra de Capello, (which had remarkably short fangs, and had been kept for two months without food,) was applied, after a slight incision, a snake-stone, which adhered for a minute or two, and then dropped off. The usual signs of poison soon appeared, but the bird survived one hour and ten minutes.

OBSERVATIONS.——The stone employed on this occasion was one I had received as a present in Syria, from a gentleman who had resided in Egypt, and who assured me, that in a long series of years at Alexandria, the stone had acquired such reputation for the cure of venomous bites, as had produced frequent applications for the loan of it; and that its efficacy had been confirmed by numerous trials. A single experiment proves but little, and I found no disposition to make more.

The inutility of what are called snake-stones, has been shown sufficiently by Fontana's experiments; § and

* Traité sur le Venin de la Vipere, Tome IV. p. 16.

† See the work last referred to, p. 16.

‡ As above, p. 12.

§ Traité. Tome II. p. 73. 76.

they have also shown how little several other applications (though highly recommended) are to be depended on; as quick lime, magnesia, caustic alkali, absorbent earths, calcined hartshorn, neutral and sea salts, &c. &c.

He speaks more doubtfully of the application of hot oils, particularly oil of turpentine; and of immersion of the limb into hot lime water, salt water, or even plain water.*

Cantharides administered internally; Peruvian bark; and emetics; though certainly not specifics, could not (according to Fontana) be pronounced absolutely useless: but he found scarification, as well as the actual cautery, to be rather prejudicial.†

The only remedies established, by his experiments, as effectual, under certain limitations, were amputation and ligature; on both which, some remarks will be found in the following Section.

I shall conclude the present Section with an account of the Tanjore pill, the only internal remedy used in the foregoing experiments.

It was communicated to me by Mr. Duffin, at that time surgeon to the garrison of Vellore, a gentleman of most respectable character, afterwards chief surgeon at Fort St. George, and now in England.

The following is an extract from his letter, dated January, 1788, with which I was favoured, in consequence of a general invitation for information on the subject of serpents, circulated on the coast of Coromandel, under the recommendation of the Board of Madras.

"Having lately seen your public memoir on the subject of snakes, I take the liberty of sending you the formula of a remedy which has been used with success in the bites of all poisonous animals, even of mad dogs. I procured it through the medium of the Rev. Mr. Swartz, who had influence with a native of Tanjore, to impart it for a pecuniary consideration.

"The deleterious quality of the arsenic was not the only objection to using it; for I was also given to understand, that two of the other ingredients, the velli-navi and the neri-visham, were poisonous roots; and the third, the nervalam, was a drastic purge. All these three are found in every bazar in this part of the country, but, on account of their poisonous qualities, cannot be purchased without the knowledge of an officer of the police. They are indigenous on the Malabar coast, and used in composition, by the native practitioners, in a variety of diseases, besides those from animal poisons.

"I was assured by Mr. Swartz, that, to his knowledge, the medicine had been used repeatedly; that no alarming symptoms occurred from it; and that it never failed in effecting a cure, when given in time, before the poison had affected the whole system."

Mr. Duffin then gave the histories in detail of two cases, in which he himself had successfully given the medicine; and added, "I have since administered the pills to thirty or forty patients bitten by different kinds of snakes, some of which were probably innocuous: as I seldom had occasion so give more than two pills, and that at an interval of fourteen or fifteen hours; the cases being attended by no alarming symptoms. The pills generally occasioned a nausea and purging, but seldom in a violent degree."

"Receipt for the composition of the pills for the cure of venomous bites.

"White arsenic; roots of velli-navi; roots of neri-visham; kernels of nervalam; pepper; quicksilver;—of each an equal quantity.

"The quicksilver is to be rubbed with the juice of the wild cotton, till the globules become invisible. The arsenic being first levigated, and the other ingredients reduced to a powder, are then added, and the whole is beaten up together, with the juice of the wild cotton, to a consistence fit to be divided into pills."

DIRECTIONS FOR USING THE SNAKE PILLS.

"If a person is bit by a Cobra de Capello, mix one of the pills with a little warm water, and give it to the patient. After waiting a quarter of an hour, should the symptoms of infection increase, give two pills more;

* Traité, Tome II. p. 8. † Ib.

should these not sufficiently counteract the poison, another pill must be given, an hour after. This is generally found sufficient. The wound should be dilated, and the warm liver of a fowl applied to the part.

" For the bite of all kinds of vipers, viz. Viriyen Pamboo, Valancy, Sidamand-Eli, Rettamand-Eli, give two pills; and if the poison is not counteracted within half an hour, give two pills more: but if the life of the patient should appear to be in great danger, four pills may be given: an incision should be made on the top of the head, and a pill pulverized should be first rubbed on the wound, then the liver of a fowl applied to the part.

" For the bite of all other less poisonous snakes, one pill every morning for three days is sufficient. The patient ought to keep a regimen for six days, eating only congee (rice water) and rice, or milk and rice. He should abstain from salt, and his drink may be warm water. Sleep is to be prevented for the first twenty-four hours."

Mr. Duffin had obligingly supplied me with specimens of the several ingredients, the Malabar and Gentoo names being affixed to each; and from the specimen of the wild cotton, I found it to be the *Asclepias gigantea*, a plant which grows every where on the coast of Coromandel. The roots and seeds are produced on the Malabar coast; and I expected specimens of the plants from Bombay before leaving India, but was disappointed. The seeds looked like those of some species of *croton*.

In the mean while, I determined to make a few experiments with the unknown ingredients separately. The result of which was, in short, as follows:

Five grains of the velli-navi root, almost without exception, killed chickens in little more than an hour. They sometimes were visibly affected in ten minutes, but generally not in less than half an hour. They first purged once or twice, then drooped, and couched on their belly. The throat was next affected with a constant tremulous motion, and the head at times drawn downwards convulsively. The tremor extending to the whole body, the legs soon became convulsed, and the bird expired, sometimes in forty minutes, and almost never later than in an hour and twenty minutes. One or two chickens that escaped, were much indisposed for several hours; but none escaped where the throat became convulsed.

The crop in all became much inflated; but nothing remarkable was discovered upon dissection.

To a stout dog, half a dram of the velli-navi, mixed with a bit of bread sopped in milk, was given in the morning before he had taken any food,

The dog, in twenty minutes, became sick, stood with his mouth open, lolling his tongue out, and panting; but drank of milk and water when offered to him. The sickness increasing, he refused drinking more, and howled as if in much distress. He lay down, and his flanks laboured much. In about an hour he vomited, and became still more unquiet. In this state he continued three hours, having vomited twice more, at intervals. He had no stool till after noon. In the evening he was very well.

The neri-visham in a dose of five grains produced no other effect on chickens than purging gently once or twice. The dose increased to ten grains, had a little more effect in the same way. An infusion of two drams of the root in water was given to two chickens; to one, one fourth part; to the other, the remainder. The first seemed no more affected than with the powder; the other appeared sick, drooped for an hour or two, purged moderately, and then became lively as before.

The nervalam, in doses of five grains, had no visible effect whatever on the chickens. In doses of twenty grains, they purged briskly several times.

It should be remarked, that both roots and seeds seemed to have been long kept, and the former had in some parts been touched by worms.

From the foregoing experiments, none of the unknown ingredients appear to be deleterious, the velli-navi excepted.

The pills received at different times from Vellore, Madras, and Arcot, varying considerably in colour, I was induced to prepare a mass myself, exactly according to the receipt, with a view to discover the cause of these variations. The mass so prepared was found of a much darker colour than any of them, owing, I believe, entirely to the mercury being more carefully mixed; for, though it succeeded at last, the mixing the mercury with the juice of the asclepias proved a tedious process. To half an ounce of quicksilver, above two ounces of the juice were employed; great part of which evaporated in the course of the process. The arsenic was finely levigated; the roots and pepper were pounded separately; the seeds were too oily to pass the sieve, but were well mixed with the powders, before adding the mercury.

Four drams of each of the ingredients entered the composition, making three ounces; but the mass when prepared, including the juice of the asclepias used in the preparation of the mercury, and in forming the mass, weighed four ounces and one dram.

In the original receipt, the size of the pills is not specified; but on weighing those sent me from Vellore, Arcot, and Madras, ten or eleven pills were generally found to weigh one dram; in which circumstance, they agreed with those prepared by myself, when equally dried; though eight pills only were formed from each dram of the recent mass.

When the mass was prepared, I tried several experiments on sound dogs, and chickens; for though I had given the pills before, to empoisoned dogs, it was not certain how far their operation might differ, when not affected by the stimulus of another poison.

The result was, that two pills given on a fasting stomach, generally produced vomiting and purging, though not violent, nor attended with symptoms of much disorder; and the dog was very well after six or eight hours. A dose of four pills produced more evident inquietude, with repeated vomitings, and more violent purging, but in twelve hours, the appetite for food returned.

In chickens well grown, one pill produced repeated purgings, and in two or three hours convulsions and death. Half a pill likewise proved fatal, but more slowly. Chickens survived a dose of a fourth of a pill.

When the pills were given in a liquid form to dogs, they often appeared to produce a burning heat in the throat, with a large discharge of saliva; but this was not observed where the pills were swallowed at once, concealed in crumb of bread moistened.

In the original directions, the pill is ordered to be powdered and mixed with water. This probably is with a view to hasten its operation; a circumstance of material consequence in cases of the bite of venomous snakes, where the progress of the poison is sometimes incredibly rapid.

I am not, however, certain, whether quickening the operation of the medicine, is the sole reason for ordering it to be given in a liquid form; perhaps something also may be expected from its immediate action upon the mouth and throat. Some of the other Indian remedies against poisonous bites, are directed to be only rubbed on the palate, or in very small quantity applied to the eye. These, like the present medicine, are also of an acrid quality; and I was informed by a medical gentleman, who, in a case of a woman bitten by a snake, attended with the most alarming symptoms, applied one of these remedies in the manner above mentioned, successfully; but that an ophthalmia was the consequence, by which she had nearly lost her eye.*

I had no opportunity of trying the Tanjore medicine on the human subject, in cases of bites of serpents; but I have, at different times, given it to fourteen persons bitten by mad dogs. It generally operated upwards twice or thrice, and downwards three, four, or five times; but the retchings neither were violent, nor were the stools remarkably griping. In some instances it did not vomit once; and, in two instances only, it purged ten times.

* An Indian remedy, said to have been originally brought from the Madura country, got into high reputation, by means of the Jesuits at Pondicherry; in so much, that there was hardly a French officer in the army who was not provided with a little of it, contained in a very small box, which he carried constantly about him, as an infallible cure for venomous bites. I never saw this remedy tried, which many of the English gentlemen preserved in very minute gold boxes; but was informed by Mr. James Bourchier, that he had made at least twenty experiments with it, on sheep bitten in the thigh by the Cobra de Capello. The result of his experiments varied very little. All the sheep died nearly in the same manner; that is, in about twenty-five minutes, they sunk down, unable to stand, and in five minutes more expired.

The medicine used was that prepared by myself, and which was found to operate more sharply than the pills sent from Tanjore.

The safety of the remedy, notwithstanding the large proportion of arsenic, may be inferred from the instances now produced, joined to the much more extensive experience of Mr. Duffin.* Its efficacy, is a matter of much more difficult discussion, and so far as respects the canine poison, belongs not to this place.

SECTION VII.

Of the Effects of the Poison of Snakes on the Human Body.

It has been called in question, whether in Europe, the bite of the viper ever proves fatal to man. The Abbé Fontana, who was at pains in making inquiry, in different countries, never met with one well attested instance of its occasioning death. He found, from his own experiments, that to some even of the domestic brute animals, repeated bites of more than one viper did not prove fatal; and he considers the variety of opposite and trifling remedies, to which cures have often been ascribed, as a proof that the disease produced by the poison of the viper, cannot be very dangerous. " Une maladie qui cede à tous les remedes, même à ceux qui sont opposés " entr'eux, n'est jamais une maladie dangereuse.†

The case is widely different in respect to the poisons of the Cobra de Capello, and some other Indian serpents. That man is subjected to their deleterious power, is a fact confirmed every year by too many fatal accidents; and the experiments produced in the preceding Sections, put it beyond all doubt, that the stronger animals, who resist the poison of the viper, rapidly give up life, to the single bite of a Cobra de Capello.

Of the remedies to which cures of venomous bites are often ascribed in India, some are certainly not less frivolous than those employed in Europe for the bite of the viper; yet to infer from thence, that the effects of the poison cannot be very dangerous, would not be more rational, than to ascribe the recovery of a person bitten by a Cobra de Capello, to the application of a snake-stone, or to the words muttered over the patient by a Bramin.

It is established by experiments on brute animals, that highly deleterious as the poison of serpents is allowed to be, it does not to them prove constantly, or infallibly fatal. The case from analogy, may be presumed to be the same in respect to man: but is with more certainty known, from the frequent recovery after threatening symptoms have come on, not only where insignificant remedies alone were employed, but where no remedy whatever had been applied.

Experiments on brutes serve also to ascertain circumstances, and to discover the causes, of anomalous variations remarked in the operation of poison, as they relate either to the state of the snake, or the predisposition of the patient. In respect to the human subject, experience in these variations is, for obvious reasons, extremely circumscribed: the snake that inflicted the wound often escapes unknown; and accurate histories of the consequent disease are few in number.

It was matter of surprise, as well as of regret, to find so little known on the medical history of serpents, in a country where much might have reasonably been expected. Numbers of stories, it is true, were to be met with of the fatal effects, as well as of singular cures, of venomous bites. But such were, in general, related merely from memory; the progress of the disease, and succession of symptoms, had either not been attended to, or were indistinctly recollected; the same story told at different times, was found to vary in material circumstances; and the marvellous too often found place in the narrative.

It is therefore to be wished that the medical gentlemen in India would in future bestow more attention on this subject than appears to have been done hitherto; calls upon them, in their professional line, are not fre-

* For an account of an Indian remedy, for the elephantiasis, of which arsenic is the principal ingredient, see Asiatic Researches, vol. II.

† Traité sur le Venin de la Vipere, &c. Tome II. p. 32.

quent; the Europeans in India being less exposed to accidents from serpents, than the natives: and the natives, on similar occasions, either have recourse to nostrums of their own, or to the prayers of the Bramins. The Sepoys, however, afford a wide field for observation; and in the territories of the Company, the surgeon of the settlement would seldom be denied such access to persons bitten, of whatsoever rank, as might at least enable him to describe the course of the disease: but opportunities of information must be sought for; not left merely to chance.

The great desideratum is materials for a medical history of the disease proceeding from the bite of poisonous serpents: in which view every case, if faithfully related, (whether remedies have or have not been applied, whether it terminates happily or fatally;) becomes of importance; even very defective cases, and transient remarks, are not without utility; as in combination with more complete narratives, they may conduce to the improvement of the proposed history.

But progress towards such improvement, can only be expected from the united exertions of gentlemen in the different situations in India; and it will admit of little doubt, that a general resolution to communicate their respective observations to the Medical Board, would prove the means of preserving many valuable materials, which are irrecoverably dispersed, or lost, from the want of a public repository.

Having premised these general observations, which are submitted to the consideration of the faculty in India, I shall produce, as a specimen, the little I myself have been able to collect on the subject: considering it merely as the slender beginning of a collection of medical facts, to be enriched hereafter, by the future communications of others.

The two following cases were communicated to me by Mr. Duffin, in January, 1788.

Case I.——" A Malabar woman was bitten in the small of the leg, by a Cobra de Capello. I saw her about ten hours after the accident. She had lost her senses of seeing, and feeling; and deglutition was so much impeded, that hardly any thing could be got to pass into the stomach. No other parts were visibly affected by spasms; but a torpor and listlessness pervaded the whole system, and from the moment of the bite, had continually increased.

" With some difficulty, I got her to swallow one Tanjore pill. The wound was dilated, and dressed with mercurial ointment.

" The pill producing no sensible operation, a second was given, at the distance of three hours, but, like the former, it had no effect. After waiting four hours longer, a third pill was given, which operated gently by stool, and produced a general moisture upon the skin.

" After this, that is in about eighteen hours from the bite, she gradually recovered her feeling and her sight, and could swallow more freely.

" A pill was given every morning, for the three succeeding days, without occasioning any sensible operation, except a nausea, and a diaphoresis. She remained weakly eight or ten days; and then recovered without any other remedy."

Case II.——" Some months after the above accident, a private soldier of the third regiment, named Peter Francis, was bitten by what the natives call *Viriyen Pambu*, a small brown snake.* The bite was in the middle finger of his left hand, and before I saw him, he had used the precaution of tying a string round the finger above the wound, to stop the circulation. It was not more than a quarter of an hour from the bite, that he got one pill, and the wound was dressed as in the former case. Upon dilating the wound, a desert-spoonfull of blackish coloured blood issued out; and instantly upon untying the string from the finger, he complained of a violent pain, shooting upwards to his shoulder, with a sensation of burning all along his arm.

" The man was then sent to the barracks under the care of his comrade, who was provided with directions, and two more pills, to be given if necessary.

* See Descriptions, No. IV.

" The pain and burning sensation of his arm continued three hours, he became more and more restless, and as the pill had not operated, a second pill was given. The inquietude greatly increased, and he was seized with a delirium, accompanied with spasms.

" In this alarming state, a third pill was given, about an hour after the second. A vomiting and purging immediately succeeded in so violent a degree, that in the morning, when I saw him, he was hardly able to stand: but he was free from pain, and complained only of weakness. He took a pill two mornings following; after which he was well, and in four days able to do his duty."

Mr. Duffin favoured me also with the following case, communicated to him in a letter from Mr. James Ramsay, assistant surgeon to the third regiment of cavalry, dated November 10, 1786, from the cantonment near Arcot.

Case III.——" A Dubash belonging to Cornet M'Gregor of the cavalry, was bitten in the toe by a snake, which, from his description, appeared to be the Cobra de Capello. A few drops of blood issued from the part, and he was sensible instantly of pain. When he came to me, about half an hour after the accident, the pain had advanced as high as the joint of his knee. I immediately prepared, and gave him one of the snake pills as directed; and, that no part of the prescription might be omitted, the liver of a frog was applied to the wound. In the course of ten minutes after giving the first pill, the pain had got to the top of his thigh, and became much more severe; I then gave him two more pills, and ordered a bottle of Madeira to be warmed. Of this he drank about two cupfulls, but a part only remained on the stomach. The patient now complained of severe pains in his belly, which upon examination appeared tense, and much swelled. A sense of tension, or tightness, spreading fast towards the breast, and respiration becoming extremely laborious, an attempt was made to make him take two pills more; but deglutition being impeded, a part of them only reached the stomach, and was immediately rejected. From this time the stricture on the œsophagus increased so much, that nothing could be forced down his throat; he foamed at the mouth; his eyes stood staring and fixed; his pulse and respiration became hardly perceptible; and, in short, every vital motion seemed at a stand. I applied spirits of hartshorn to his mouth and nostrils, by which, in a few minutes, a strong sneeze being excited, he immediately began to breathe, and soon pronounced the word *better*. After he had recovered a little, he told me " he felt the pain descending retrograde, in the same track in which it had arisen;" and expressed a strong desire to sleep. He slept for a quarter of an hour, and, upon his awaking, vomited plentifully. He had now recovered his senses, and said he felt only a little pain in his foot, which at last descended to his toe: and, in the course of two hours more, he was able to walk home; but did not recover the fatigue for some days.

" I suppose the vomiting to have been occasioned by the pills, the effects of which, however, did not seem to be so violent as they are commonly said to be. The man told me, he only felt them make his stomach a little warm."

The three cases following were communicated to me, by Captain Gowdie, in a letter dated from Rajahmundrah, March 20, 1788.

Case IV.——" A Havildar in Captain Gowdie's battalion, a man fifty years of age, was bitten by a snake on the little toe of the right foot, about one in the morning, in the guard-room. He was not, at the instant, sensible of much more pain than what is occasioned by the bite of a large ant, and lay down to sleep. At daylight, when the guard turned out to ground arms, he was found almost stiff, yet still retained the power of speech, and declared he should inevitably die in consequence of the bite. He complained very little of pain; but seemed to suffer a general stupor; he had totally lost his sight, and expired before seven in the morning."

Case V.——" A Sepoy of the same battalion was bitten, by the same snake, on the inside of his left wrist, within a minute after the Havildar. He also complained less of pain than of drowsiness, and went to sleep. Upon getting up at daylight, he complained of a dimness of sight, and was ordered by the black doctors to be led about, and to be kept in motion.

" At eight o'clock in the morning, upon examining the wrist, I could perceive two small punctures, about the eighth of an inch from each other. At ten o'clock, he had lost his sight entirely, and was unable to keep

on his legs longer; but he chiefly complained of being hindered from going to sleep. Soon after this, he was permitted to lie down; and (as in the preceding case) without convulsions, or suffering any visible agony, he expired half an hour before noon."

The bodies were not buried till four hours after death, when they began to putrify.

To the above circumstances, noted by Captain Gowdie at the time, he added the following description of the snake: "It was scarcely six inches in length; about the size of a large goose quill; of a dark straw colour; a flat head, with two very small eyes, which shone like diamonds; and behind each eye was a black streak, about three fourths of an inch long.

"The trunk, not tapering in the usual manner, was nearly as thick at the tail as at the head. Its mode of progression was also different from that of other snakes. It sprung forward, a foot at least at each spring, falling to the ground head and tail foremost. As it lay on the ground, it formed two thirds of a circle.

"The name given to it by the natives was, *Min Naig Paum.*"

OBSERVATIONS.——The absence of convulsions in the above two cases, was remarkable; as also the uninterrupted propensity to sleep.

The snake was unfortunately not preserved; and notwithstanding the exertions of Captain Gowdie as well as Mr. Macmahon the surgeon, I never could procure a specimen.

Case VI.——In consequence of these two accidents, Captain Gowdie issued orders, that in case of any one belonging to the battalion being bitten by a snake, he should immediately be brought to him.

"In about a fortnight after this order, a Sepoy happened to be bitten on the ankle by a large snake, believed to be a Cobra de Capello, and was brought to Captain Gowdie's house, within a quarter of an hour after the accident.

"His jaws were locked, his eyes fixed, and very little sign of life remaining. Four large punctures were visible on the ankle; to which *eau de luce* being applied, the man gave marks of sensibility, by drawing up his leg. Two bottles of Madeira wine were then made warm, and the jaws being forced open so as to introduce a funnel, almost the whole of the wine, in the course of half an hour, was poured down. The application of the *eau de luce* was continued constantly for three hours, till a whole bottle was expended. The patient was now totally without any sense of feeling whatever; and had it not been for a gentle heave of his breast every two or three minutes, I should have thought him dead.

"He remained in this torpid state forty hours, and then began to show signs of returning life; it was twelve hours more before he recovered his speech; and he continued many days in a very languid state. He is now one of the stoutest men in my first grenadier company."

OBSERVATIONS.——From the sudden appearance of formidable symptoms, the progress of the poison must here have been extremely rapid. As nothing is said of the swelling or discoloration of the ankle, it is probable the local affection was inconsiderable. Supposing the man not accustomed to spirituous liquors, the stupor might partly be imputed to the large dose of Madeira wine; but torpor is also a common symptom of the poison.

Madeira wine is the internal remedy most commonly used on such occasions, by the Europeans in the Carnatic; and numerous instances are produced of persons not dying who had recourse to it. But in many of those instances, two material circumstances are left not ascertained, viz. whether the snake that bit was or was not venomous, and whether the person bitten was infected. In the present case neither circumstance admits of doubt; but then another remedy, to which high virtues have been ascribed, was applied at the same time with the wine.

In the second volume of the Asiatic Researches, six cases are related, in which the volatile alkali is supposed to have been successful. They were selected from a number which had come to the author's knowledge, who adds, "that he never knew an instance of the volatile caustic alkali failing in its effect, where the patient has been able to swallow it." He at the same time gives it as his opinion, "that it does not so much act as a

specific in destroying the quality of the poison, as by counteracting the effect on the system, by stimulating the fibres, and preserving that irritability which it tends to destroy."

It is to be regretted, that Mr. Williams had not been more precise as to the extent of his experience, and that the selected cases had not been more circumstantially related. In two of them, a ligature had been applied; in three of them, the symptoms do not appear to have been formidable; and of the seven cases, one only proved fatal.

The volatile alkali, as a specific against the poison of the viper, was brought into vogue at Paris, in consequence of its supposed success in a case related in the History of the Academy of Sciences for 1747; and was supported theoretically, on a supposed acid property of the poison; an opinion at first propagated by Dr. Mead, but relinquished by him in the sequel.

The subject was again revived at the distance of ten or twelve years, in a book written by M. Sage of the Royal Academy, who proceeded, as if on the authority of Dr. Mead, in an opinion which he did not know that the Doctor had long before retracted.

The Abbé Fontana, in consequence of a number of experiments made with the volatile alkali on various animals, gives his most decided opinion against its utility, and even suspects it of having done harm.* He thinks the instances produced of its good effects on the human subject, of doubtful authority; and argues strongly against the possibility of its acting by its alkaline quality, when applied externally to the skin; showing, from several experiments, that it cannot penetrate the skin, so as to act on the acid quality of the poison, was that even admitted to exist.

In so far as the volatile alkali (according to Mr. Williams) is supposed to act merely as a stimulant, the Abbé's objections apply with less force, at least to giving it internally; but the use of its external application, unless it be supposed to act on the quality of the poison, seems very doubtful.

Case VII.——"The porter of Mr. Bourchier, Governor of Bombay, a very stout Arab, was bitten by a small serpent, and expired almost instantaneously, after exclaiming that a snake had bit him."

The above account I had from the Governor's son, Mr. James Bourchier, who spoke from memory; and added, "that the snake, to which the man's death was imputed, was, by the Portuguese, called Cobra de Morte; that in the course of twenty years in India, he had only seen two of them, one on the island of Bombay, the other in his own house at St. Thomas's Mount, near Madras. That the length of the snake was from six to nine inches; its thickness that of a common tobacco pipe. The head black, with white marks, bearing some resemblance to a skull, and two cross bones. The body alternately black and white, in joints, the whole length; that its venom is of all others the most pernicious."

Case VIII.——"A Gentoo boy in the service of an English officer of the army, had been forbid by his master to smoke tobacco. The gentleman returning one morning from shooting at an earlier hour than was expected, alarmed the boy, who happened at the time to be smoking a *chirroot* (segar). In eagerness to extinguish the *chirroot*, and conceal his offence, the boy run to an old wall behind the house, and thrusting the burning *chirroot* into a hole in the wall, was bitten in the hand. He exclaimed loudly; and his master, with a servant, running to know what had happened, found the boy hardly able to give an account of what had befallen him: in a very short while after, the boy expired.

The snake was not found. The gentleman did not pretend to be precisely exact as to time, but was pretty confident that from the time of the boy's exclamation till his death, not more than ten minutes could have elapsed.

Observations.——I have produced the last two cases, though very incomplete, as affording instances of death remarkably sudden. In Case IV. the Sepoy expired within six hours after the bite; which agrees nearly, as to time, with the few fatal accidents I heard of while in India. A man bitten at Vizagapatam, a few days after my arrival, died in less than twelve hours; but, the accident happening at night, it was not known what serpent had bit him.

* Traité sur le Poison de la Vipere, Tom. I. p. 97; et Tom. II. p. 237.

The snake mentioned in Case VII. comes very near the description I have often had of the Cobra Monil, which, as I have mentioned in another place, I never could procure, though great pains were employed in the search.

The snakes which did the mischief in Cases IV. V. and VI. were certainly different from any of those contained in the present collection, and on that account become more particularly objects of inquiry. In Case VIII. the snake was not found; which frequently happens, when persons are bitten by snakes accidentally crossing the road in the night; for though immediately pursued by some of the company, the snake usually makes its escape among the stones and bushes, especially if it is small in size.

Case IX.——In the beginning of June 1788, a Gentoo man, about forty years of age, was bitten by a Cobra de Capello, in the fleshy part between the thumb and the fore-finger.

He was one whom I retained in my service for the purpose of procuring serpents, and also, as he was very adroit in handling them, for assisting in my experiments. He met with the accident after sunset, in attempting, at the request of some neighbours, to catch a Cobra de Capello, just before discovered in one of the houses of the village. His usual caution seemed to have deserted him, or, as he pretended, he missed his aim in the dusk.

The account he gave was, " that he felt instantly a sharp pain in the part bitten, which soon spread on the " palm, and upwards on the arm. He was sensible also of sickness at the stomach, but did not vomit. In " less than an hour, the hand and the wrist were considerably swelled, the pain extended nearer the shoulder; " he was sensible of a confusion in his head, and a strong disposition to doze." From this time, he himself was for several hours ignorant of what had passed; but from the report of those about him, (so far as could be collected,) " he at times showed much inquietude, without making any specific complaint; at other times " he lay moaning, and dozing. Towards midnight, his disorder increased, startings about his throat were " observed, his breathing became laborious, he could not speak articulately, and seemed not to perceive objects, " though his eyes were open."

They had applied a poultice of herbs to the arm, and administered a secret antidote internally; besides which a Bramin performed his functions: but finding he grew worse and worse, it was determined after midnight, by the relations, to acquaint me with what had happened.

Between one and two in the morning, I sent back the messengers with two doses of the Tanjore medicine prepared in draughts. On their return they found the patient much better; he had recovered his senses, and finding that the messengers had omitted to inform me of his having already swallowed a medicine, he declined taking the draught, lest the two remedies should happen not to agree together.

In the morning, I found the hand and arm monstrously swelled, and I suspected the parts round the punctures were livid; but part of the poultice adhered so closely, and had tinged the skin of so deep a yellow, that I could not absolutely determine.

The man had perfectly recovered his senses, he had no fever, complained only of confusion in the head, of languor, and of pain in the arm.

The bark was ordered, but a few doses only were taken. The parts about the punctures mortified first, the gangrene then spread over the back and palm of the hand, and part of the wrist, laying the tendons bare, and forming an ulcer of considerable extent; which, however, healed favourably, under the usual treatment. He recovered his health in eight or ten days; but it was several months before he recovered the use of his hand.

Observations.——The external, or local disease, was remarkably severe in this case; and, from the account of the patient, it was near an hour before he was sensible of the confusion in the head, and drowsy disposition. In Case V. the most formidable internal symptoms appeared within a quarter of an hour, while the local effects of the poison were slight.

It has been observed in animals, that where a ligature was applied immediately after the bite, with a view to prevent the access of the poison into the current of circulation, the internal disease was mitigated,

or entirely prevented, while the local malady was invariably more considerable, than where no ligature had intercepted the course of the poison.* Hence it has been conjectured that the poison, so confined, may expend its force in producing the local disease in the vicinity of the bite; or in a certain time may become so changed, as to be admitted into the circulation, with little or no danger.†

Experience only can decide on the justness of this conjecture; and experience hitherto, so far as respects the human subject, affords but little assistance. It is therefore a matter highly meriting future attention in India, as tending to regulate or direct the practice of ligatures, as well as of amputation, both which have been found for certain animals, the only infallible remedies against the deleterious power of the poison of the European viper, when employed in due time.

The operation of viperine poison, though very rapid, is not instantaneous; a certain time intervenes before its effects become visible; and this in some animals, has been nearly ascertained by experiments. In pigeons, where amputation, or ligature, was employed within twenty seconds after the bite; and, in guinea pigs, within five minutes; mortal consequences were prevented: but if longer deferred, the animals infallibly died.‡

In respect to the human body, the precise time within which amputation, or ligatures, may be employed with success, remains as yet unknown; and, as experiments here are not admissible, it can only be discovered in the tedious progress of incidental observation. In the mean time, the efficacy of both, may not only be inferred by analogy, from their success in brutes, but is supported in some degree, by experience in the human species. Difficulty must, indeed, arise from ignorance of such circumstances as render amputation absolutely necessary; but ligature is not liable to the same objections.

A circumstance, in regard to amputation, which occurred in the course of the Abbé Fontana's experiments on pigeons, deserves particular notice. Where it was performed too late to prevent the mortal effect of the poison, death seemed rather to be accelerated than retarded, by the removal of the local malady with the limb,§ which could not be considered as a consequence of the simple amputation, because pigeons, when not poisoned, always survived the operation.

In regard to ligature, he ascertained its success, though not applied so tight as entirely to stop the circulation;‖ and he considers this as confirming an opinion, that the poison was communicated by the blood, not by the more minute vessels: having found by former experiments, that when applied to superficial wounds of the skin, no ill effects followed.

The Abbé's experiments on this head are more particularly interesting, as ligature, if equally secure, must always be preferable to amputation: besides its being suited for more general application.**

* Traité sur le Venin de la Vipere, Tome II. p. 51. † Ib. p. 24. ‡ Ib. Tome I. p. 237. 243. 249. Tome II. p. 15. 28.
§ Ib. Tome I. p. 246. 250. ‖ Ib. Tome II. p. 22.

** Ligature in the case of venomous bites, made part of the practice of the ancients. "Igitur in primis supra vulnus id membrum deligandum est: "non tamen nimium vehementer, ne torpeat." (De Medicina, Lib. V. cap. 27.) In this, which Celsus had borrowed from his predecessors, he was followed by Galen, and the subsequent Greek physicians, as also by the Arabians. (Galen de Locis Affect. Lib. III. c. 7. Ætius, Tetrab. IV. Serm. i. c. 25. Avicenn. Lib. IV. Fen. 7. Trac. 4. cap. 27.)

From the Abbé Fontana's manner of expressing himself on the subject of ligature, it would seem that he had not adverted to its being practised by the ancients. (Traité, Tome II. p. 41.) He remarks, that neither Redi nor Mead made any mention of it, and that what Kempfer had said of it, would rather have discouraged the trials he was induced to make from his own discoveries, (p. 44.) As to Kempfer, he surely is, without cause, accused of credulity in the passage alluded to, (Amœnit. Exot. Fascic. III. p. 573.) and his character as a careful and faithful observer, unjustly called in question. (Traité, Tome II. p. 44.) The Abbé, indeed, afterwards discovered, (p. 69. 77.) that he had misstated Kempfer's opinion of the snake-stone; and it is only to be regretted, that he had not more explicitly retracted the harsh insinuation contained in page 41. His respect, however, for Kempfer's authority, induced him to make many trials of the method by ligature, scarification, and application of Theriac, conjoined; but the result of his experiments was unfavourable to the practice, (p. 79.)

SECTION VIII.

Miscellaneous Experiments and Remarks on Serpents.

I. *May* 12.——A mangoose (caught only two days before) being brought to me, I determined to try him with a Katuka Rekula Poda, which had been long captive, but was in good spirits, and had not been disturbed for eight days. The mangoose being very wild, was secured by a long string, in such a manner as to prevent his escape, without impeding his activity.

The snake, when set at liberty in the room, hissed as usual at first, but soon coiled himself, with his head couched in the centre. The mangoose, when set down in sight of the snake, seemed more disposed to make his escape than to make an attack; and when forced to approach near, the snake hissed, but neither offered to raise his head, nor to move from the place.

After several attempts to bring them to an engagement, which both seemed to decline, the mangoose, happening unintentionally to be forced too near, was bitten by the snake on the shoulder; upon which he seized the snake by the neck, and held fast for fifteen seconds, the snake all the while wreathing round the mangoose's limbs.

The instant they were separated, the mangoose fell down on his side, as if dead: in which state he was carried out of doors, and laid on a grass plat surrounded by a hedge. Breathing was the sole sign of life for near a quarter of an hour, when, being touched by the hand, he unexpectedly started up, and run a few paces towards the hedge, but lay down before he reached it, and the fore leg was visibly affected. The string being first lengthened to allow of a wider range, he was left to himself.

At the end of half an hour, he appeared much revived; but remained lying on one side, without moving from his place, except when touched by the hand. After one hour and a half, he appeared so much better, that I entertained strong hopes of his recovery. He did not now lie on his side, he only couched; and, though still lame, he moved much more briskly, when touched. Soon after this, the torpor returned, he again reclined on one side, and, without visible convulsions, expired in two hours and a quarter after the bite.

The snake's wound bled a good deal; he appeared much duller than before, though he still hissed when touched. In one hour and a half, he appeared to be dying, and could not be provoked to hiss. He lingered, however, eight hours before he expired; retaining life, in appearance, in the tail only, for several hours before death.

II. *May* 31.——A Katuka Rekula Poda was set at liberty on a wide green field, and a mangoose in a cage, where he had been kept a week, was placed at a little distance. The snake moved slowly along, not faster than usual when in a room, and made towards the cage, as if in search of refuge; from whence turning off, he came back to the place he had set out from, and coiled himself up.

The door of the cage being now opened, the mangoose made no offer to come forth; and when forced out, he at first looked steadily at the snake, and then run away towards a hedge at some distance. Being secured by a long string, he was soon brought again close to the enemy: but he showed much less disposition to attack than to retreat either to the cage or the hedge.

At length he seemed to set the snake, and of himself approached very near; but on the snake raising his head and hissing furiously, he again fled towards the hedge. He was several times forced back, and as often fled in the same manner; till at last seizing the snake as the head was raised, he bit it severely in the mouth, without being himself visibly hurt. As soon as they were separated, the mangoose run off; and, after running about on the green, was permitted to retreat into the hedge.

He was preserved with a view of trying him with a Cobra de Capello; but this was prevented by my snakeman happening unluckily to be disabled by an accident. (See Sect. VII. Case IX.)

III.——I was informed by Mr. James Bourchier, that he had more than once made trial of the combat

between the mangoose and the Cobra de Capello; and in order to prevent the former from having recourse to any herb or other remedy, the experiments were made not in the field, but on the terrace at the top of the house.

"As soon as the mangoose perceived the snake, he took his station in front, watching his motions; and when the snake struck at him, he eluded the blow, by skipping alertly to one side; returning, however, immediately to his former station. After a short skirmish of this kind, taking the opportunity, when he was sure of his mark, he caught the snake's head in his mouth, and bit quite through the skull. This generally proved mortal; but where the snake did not die immediately, the mangoose would bite his tail to provoke him to rise again, which sometimes the snake did; and then, after some feeble exertions, was sure to be killed by a second seizure."

IV. *August* 16.——A Nooni Paragoodoo, was brought near a Cobra de Capello, which had been left at liberty in a large room. The Cobra's hood was extended, and he kept his eyes fixed on the small snake, but without striking, till pushed very near him, when he struck; but did not bite. The small snake did not snap in return, but, after remaining some time quiet, moved slowly off. Being again brought close to the Cobra, but rather rudely, he was bitten near the tail, though no marks of teeth could be discerned. After a short while, the Nooni glided under the wreaths of the Cobra, and was permitted to go off quietly, without any offer to hurt him as he passed.

A very active Mega Rekula Poda, which snapped at every thing opposed to him, being brought close to the Cobra, did not attempt to snap; and when the Cobra was provoked to bite, seemed to submit without resistance. This was the more remarkable, as he continued to snap at every thing else, and seemed to spring from the ground in eagerness to attack. It did not appear that the fangs had acted, and the bite was attended with no consequence.

The next subject opposed to the Cobra, was a Gedi Paragoodoo, which, in all its movements was much tamer than either of the former two, and seemed solely intent on escaping out of the room, or retreating into a dark corner. When pushed roughly on the Cobra, and consequently struck by him, he made no resistance, nor snapped in return; he did not even offer to retreat, but laid himself close to the Cobra, whose body he often touched in his convolutions, without any apparent offence being taken.

V.——The Cobras de Capello bite each other without any consequence ascribable to their poison, even where the fangs visibly acted. (See Sect. II. Exp. XVIII. and XIX.)

The bite of a Cobra de Capello proved fatal to a Nooni Paragoodoo, and to a Tar Tutta. (See Sect. II. Exp. XVII. XIX.

A Cobra de Capello was bitten twice on the body, by a Katuka Rekula Poda; but though both fangs acted, no symptoms of poison followed.

VI.——Snakes live a long time without food. I kept two Katuka Rekula Podas from early in March to the 20th of July, and then they died from neglect; rain water having filled the pots in which they were kept.

They had been fed only once in the first week, yet in the beginning of July, when I left them, though much emaciated, they were lively, hissed fiercely, and seemingly as active as ever.

But though long abstinence does not destroy, yet it certainly impairs the deleterious power of their poison; in like manner as long captivity depresses their spirits, and impairs the fine gloss of their skin.

I never could induce the venomous snakes to feed spontaneously; such nourishment as they had was forced down their throat by means of a bamboo, and consisted of milk, or a raw egg. Frogs inclosed in the same pot with them were left untouched, though found dead; and though the snakes, when provoked to bite, readily killed new hatched chickens, they never eat them.

When frogs were placed in a corner near to which the snake was coiled up, they remained motionless, as if enchanted, without attempting to escape; but the moment the snake was removed, they jumped off, and escaped to the door.

VII. *March.*——Upon a predominant notion that snakes have a natural antipathy to garlic, is founded the

practice of laying that root bruised, at the doors and windows of bedchambers, and of tying bags of it to the posts of the bedstead.

The following trials were made with three Katuka Rekula Podas:

One of the snakes, caught only a few days before, being set down in the middle of a room, after hissing for a minute or two, proceeded directly to the wall, along which he crept slowly, from time to time raising his head, as if to find a hole for escape. Arrived at the corner of the room, and disappointed in an outlet, he quietly coiled himself up, and went to sleep. When touched with a stick, he hissed, and could not, without violence, be dislodged.

VIII.——Three long sticks being prepared, a bag of bruised garlic was tied to the end of one; to the end of the other, some of the root of the *aristolochia indica*; a root in high repute as an antidote: the third stick had nothing tied to it.

This third stick being presented to the snake when moving along, he hissed furiously, and turned aside; but if brought too near, he first snapped at it. The two armed sticks being opposed to him in like manner, produced the same effect, not apparently in a greater or less degree.

The unarmed stick, and the other with the *aristolochia*, when softly slid along the ground, behind the head, so as not to be seen by the snake, had no effect; he continued to proceed straight on: but when the bag of garlic was produced in the same manner, he seemingly avoided it by turning off to the contrary side.

This experiment repeated several times with the same result, seemed to indicate a certain degree of aversion: but when the bag of garlic was held close to the snake coiled up in the corner, and not asleep, it made no visible impression; even when placed exactly in view before him, he did not offer to move more than at the approach of the unarmed stick, and snapped at either indifferently, when brought too near.

The usual movements of the snake when undisturbed, having been remarked in the foregoing experiment, some bruised garlic was spread close to the wall along which he usually creeped to the first corner; and between that and the next corner a cross barrier of garlic half a foot in length, was placed half way, which the snake by turning a little to one side might easily avoid.

Two snakes being then set loose at the same time, the one soon coiled himself up in the middle of the room; the other set out on his accustomed tour; the garlic strewed in his track proving no impediment. After a short rest in the first corner, he set out for the second, and holding a direct course, crossed the barrier opposed to him, without hesitation; and notwithstanding garlic had been laid for his reception in the second corner, he coiled himself up very composedly, and went to sleep.

In a short while, the other snake took exactly the same route; and, arriving at the second corner, through the same intended impediments, coiled himself on the body of his sleeping companion.

Both being roused, were strewed over with bruised garlic; but they maintained their station, though at full liberty to quit it.

The recent roots of *aristolochia* employed in the same way, had no more effect than the garlic.

This experiment was not made on any of the other venomous serpents.

IX.——The poisons of all the venomous serpents I have examined, are in colour and consistence very much alike, at the moment of emission through the fangs. If they differ somewhat in colour from each other, it is not more than the poison of each individual is found occasionally to differ in itself, according to circumstances relative to the condition of the animal.

The poison is somewhat mucilaginous when first emitted, but becomes quickly more so when exposed to the air; while its colour from pale-yellowish white, changes to yellowish: and when dry, it resembles a yellow flaky resin. This resin, when long kept, grows much darker in colour, and is not easily soluble; but when recent, or in the intermediate degrees of hardening, it mixes readily enough with water, or with spirits.

X.——The only poisons I applied to my own tongue were those of the Cobra de Capello and the Katuka Rekula Poda.

One drop of the former diluted with water, and quite recent, was applied on the tongue near the tip, and five minutes allowed to elapse before I rinsed my mouth. I was not sensible of the smallest degree of acrimony.

After an interval of half an hour, I applied less than one drop of the poison, undiluted, to the tongue, as before; but the poison being now more viscid, it was necessary, in order to disengage it from the crow quill employed in applying it, to rub the tongue repeatedly. I remained ten minutes before washing, and kept all the while as still and attentive as possible. The result was the same as before. It appeared insipid and inert like pure water. I was neither sensible at first of any saline taste; nor, though strictly attentive, could I perceive any subsequent effect whatever on the tongue.

This experiment was repeated more than once, at different times, invariably with the same result.

The poison of the Katuka Rekula Poda was tried, precisely with the same success. Of a quantity which was emitted through the fangs, I rubbed almost two drops, perfectly recent, on my tongue and palate; but was neither sensible of pungency, nor any consequence from it, more than from the poison of the Cobra de Capello.

Whether the case be the same with respect to the poison of the other venomous serpents, may be conjectured, but can be determined only by trial.

XI.——The recent poison of snakes applied to the eyes of chickens, caused no visible irritation, nor was it followed by inflammation.

XII.——The recent poisons of the Cobra de Capello and the Katuka Rekula Poda, under the usual trials, gave no indication of possessing either an acid or alkaline quality. The other poisons were not tried.

XIII.——Two drops of the recent poison of the Katuka Rekula Poda, diluted with four drops of spring water, were put into a wine glass, No. 1.; and six drops of water into another glass, No. 2.; into each glass was then permitted to fall a tea-spoonful of blood from the neck of a chicken just decapitated. Both mixtures being stirred, for five minutes, with small smooth sticks, were left to settle.

The blood in No. 1. appeared of a colour considerably darker than that in the other; and a clot was found adhering to the point of the stick, of a darker colour, and more grumous consistence than ordinary. To the stick belonging to No. 2. a much smaller clot adhered, of a brighter colour, and more loose contexture.

After standing three hours, the difference was more remarkable; the blood in No. 1. remained uncoagulated, and much blacker, with a little livid coloured serum above; in No. 2. it nearly retained its primitive colour; the crassamentum was formed, and a little serum of the usual colour remained at top.

Upon repeating this experiment, the glasses were more carefully warmed, and the mixtures stirred only one minute. Very little blood was found adhering to the sticks.

The same alteration in colour was observed as before; but the blood in No. 1. was less fluid than in the former experiment, though still much more so than in glass No. 2.

XIV.——As the several poisons differ very little in appearance, so the organs which serve for their secretion and conveyance, are found, in their structure and situation, nearly the same, in the four principal Indian snakes which have been dissected: and, at the same time, vary so immaterially from the poisonous organs of the Rattle Snake and the Viper, that reference in a general way may be made to the anatomical descriptions already given of those animals, by three celebrated anatomists.*

I shall therefore confine myself to a few remarks on the poisonous apparatus of such snakes as have not been described, made either on the living animal, or on the recently dead subject; leaving other matters more strictly anatomical, to the explanation of Plates XLV. and XLVI. given by the ingenious anatomist Mr. Everard Home.

XV.——The poison of snakes being used by the natives in a variety of diseases; the snake catchers obtain it from the living, as well as the dead animal. In both they make a gentle pressure from the poison-gland along the duct, forward to the mouth. In the former, the snake, in attempting to bite the small cup held before

* Dr. Tyson, Phil. Transact. Vol. XIII. p. 35. Mr. Ranby, ib. Vol. XXXV. p. 377. Dr. Nicholls. Mead on Poisons, Appendix.

it, drops the poison gently from the fang; owing perhaps to the position in which it is held during the operation; but in the fresh dead subject, the poison is ejected through the fang to the distance of five or six inches, by the same pressure.

XVI.——A Cobra de Capello which had been divested of his fangs, in order to qualify him for a show, was made to bite a roll of white paper; having first had his mouth well cleansed with a wet rag. The liquid emitted on the paper, had the usual appearance of poison; but in doubt whether it might not be only saliva, I had the head cut off, and dissected the poisonous organs remaining.

The sac, on both sides, had been completely destroyed, and there were no vestiges of subsidiary fangs. The poison glands and ducts were entire, and on pressing along the ducts, a fluid issued from their extremities, which, in colour as well as consistence, differed somewhat from common poison. It was thicker, and more opaque, had something of a milky hue, and was longer in drying. As the dissection was preformed in less than two hours after the head had been separated from the body, this variation was the more remarkable; for in former dissections, though several hours after death, the poison was found rather pellucid, and of a white or pale yellowish colour.

It seems wonderful that bad accidents, from the mutilated serpents usually exhibited by the snakemen, are not oftener heard of. For supposing the sacs to be always as completely destroyed as in the present instance, yet the poison continues to issue into the mouth upon the jaws acting, and the holders, or common teeth, wound so as to draw blood. Nevertheless, chickens bitten by a mutilated snake showed no symptoms of poison, though they were afterwards infected, by having the poison inserted artificially which the same snake had emitted. *

But it may reasonably be suspected that the sacs are not always so carefully destroyed. Several snakemen with whom I conversed, appeared to know nothing of any fangs besides the two on each side, generally emergent from the sacs, and they seemed surprised when shown a number of small subsidiary fangs at bottom. Where these have been left, they become in time, without being suspected, capable of doing mischief; which readily accounts for the accidents that certainly happen sometimes to the professed snakemen.

I was told at Vizagapatam, of an old invalid who happened to be present at an exhibition of snakes, and observing, among other feats, the snakeman thrust a large Cobra de Capello into his bosom, he asserted he could himself do the same, swearing, at the same time, that no snake could live an hour in his country, nor would the most venomous do any mischief to an Irishman. It was in vain that the spectators remonstrated and warned him; for resolutely putting the animal between his shirt and his skin, but ignorant of the acquired art of handling it, he was bitten severely in the breast. The consequence was excruciating pain, some alarming symptoms of poison, and a local ulcer, which was a month in healing.

XVII.——The head of a Katuka Rekula Poda, being severed from the body by one stroke, was dissected at the distance of an hour. The poison gland and other parts concerned were found as represented by Nicholls, in his description of the Viper. The gland when cut transversely had some resemblance to the *epididymis*, and poison oozed out from it, not less glutinous than what is commonly found in the sac.

A small roundish gland, situated near the orbit, had no connection with the poison gland, and, when cut through, a thinner, serous fluid, bearing no resemblance to the poisonous liquor, oozed from it.

XVIII.——In the Cobra de Capello, the poison gland was of an oblong round form; a texture more compact; and proportionally shorter. The poison was glutinous as in the other snake, but paler in colour.

The gland near the orbit was wanting here. Several recent heads, which were examined, agreed in the circumstances now mentioned.

* See Sect. II. Exp. XX.

EXPLANATION OF THE ANATOMICAL PLATES.

Explanation of Plate XLV.

This Plate contains twelve figures, which represent the different appearances of the palates of innocuous and poisonous snakes; and the mechanism by which the poisoning fangs are erected in different species of poisonous snakes.

The four first figures represent the palates and upper jaws of the following snakes: the Tar Tutta, No. XV.; the Katuka Rekula Poda, No. VII.; the Cobra de Capello, No. V.; and the Bungarum Pamah, No. III.; in each of which there is some peculiarity respecting the teeth.

Figure 1. The Tar Tutta, which is an innocuous snake, has in the upper jaw two rows of teeth seemingly situated in the palate, and one surrounding the edge of the jaw.

Figure 2. The Katuka Rekula Poda has two rows of teeth, seemingly in the palate, but no marginal row. The teeth are surrounded by a fringed membrane, which almost conceals them; the points of the teeth alone being exposed, unless the membrane is pressed down. The space extending from the teeth on each side, to the edge of the mouth at the anterior part, is filled up by a large, corrugated, membranous bag, which incloses the poisoning fang. On the right side, in this figure, the mouth of the bag is so much closed as to conceal the fang, but on the opposite side, the point of the fang is exposed.

Figure 3. The Cobra de Capello has two rows of teeth, seemingly in the palate, and two poisoning fangs, differing in nothing from the Katuka Rekula Poda, but in the teeth being smaller, and the poisoning fangs much shorter; consequently the bags that inclose them are less conspicuous.

Figure 4. The Bungarum Pamah has two rows of teeth, seemingly in the palate, and two poisoning fangs, but these are still smaller than in the Cobra de Capello. It has likewise in the margin of the mouth, on each side, just behind the orifice of the bag which incloses the poisoning fang, three small teeth, which are not met with in other snakes; these may be considered as an imperfect marginal row of teeth.

Figure 5, represents the skeleton of the head of the Tar Tutta. The two rows of teeth, seemingly situated in the palate, are fixed in that portion of the bone which constitutes the principal part of the upper jaw; and the marginal row is fixed in an exterior portion, which is weaker than the other.

In snakes, the lower jaw is not articulated with the upper, as in other animals, but by means of two bones connected to the occiput; the extreme points of the posterior part of the upper jaw lie exactly between and within the condyles of the lower, and are loosely connected to them by ligaments. By this mechanism, when the snake opens its mouth, the condyles of the lower jaw, moving on the occiput by these intermediate bones, are thrown outwards, and carry the extreme points of the upper jaw along with them, and dilate the fauces to a very great degree. This motion of the upper jaw also erects the fangs.

Figure 6, exhibits the same view of the skeleton of the head of the Katuka Rekula Poda, that is represented in the last figure of the Tar Tutta. The teeth and all the other parts in this snake are much larger. The two rows of teeth, which in the living animal appeared to be in the palate, are here more distinctly seen to be fixed in the bones of the upper jaw, than in Fig. 5, as there are no other teeth in it. There is a joint in the jaw bone of each side near its anterior extremity, which gives the appearance of its having been fractured and united again. There is also a large, crooked, poisoning fang, fixed in a strong bony socket; and between this socket and the margin of the mouth laterally, there is a slender bone connected to the socket and jaw, which corresponds with that portion of the jaw in which the marginal row of teeth is inserted in the Tar Tutta, as well as in all other innocuous snakes.

Figures 7, 10, and 11, represent the side views of three upper jaws of different species of poisonous snakes, to show the mechanism by which the poisoning fang is raised and depressed, and to point out a variation in the

structure of the parts in each species, which is more distinctly seen by their being all upon one plane, and shown exactly in the same point of view.

Figure 7, represents a side view of the upper jaw of the Katuka Rekula Poda; the situation of the jaw is reversed, as the parts could not be so distinctly seen in any other way. The fang is erected, and its socket, as well as the articulation with the skull, are distinctly seen. The portion of the jaw bone which connects the socket of the poisoning fang to the jaw itself, is articulated by a joint to the socket of the fang; and when the extreme point of the jaw is moved outwards, along with the condyle of the lower jaw, in the act of opening the mouth, the upper jaw, from the joint in its anterior part, readily bends, and the bone which connects the jaw to the socket being pressed forwards, pushes the socket upwards; by which means the fang is erected.

Figure 8, represents the same parts, to show their appearance when the fang is in its recumbent state.

Figure 9, is a view of the poisoning fang in its socket detached from the skull, to show the orifice at its base, which receives the poison, and that at the point, by which it is instilled into the wounded animal.

Figure 10, represents the side view of the upper jaw of the Cobra de Capello, in which this difference is remarkable, that the lateral process, instead of being immediately articulated with the socket of the fang, as in the Katuka Rekula Poda, is articulated with a process from the socket of nearly the same length.

Figure 11, represents a side view of the upper jaw of the Bungarum Pamah. In this snake the process from the socket of the poisoning fang is still longer than in the Cobra de Capello; and has this very remarkable peculiarity, that there are three holders, or common teeth, inserted into it, which give the appearance of an imperfect marginal row, not met with in any other of the poisonous snakes known.

Figure 12. A view of the upper surface of the upper jaw of the Bungarum Pamah; to show the appearance of the joint in the jaw bone, and the joint between the process from the socket of the poisoning fang, and the lateral bone.

Explanation of Plate XLVI.

This Plate contains seven figures, representing the different appearances of the poison gland in the Cobra de Capello, and Katuka Rekula Poda.

The poison gland in the two Boa, viz. the Gedi Paragoodoo, No. I.; and the Bungarum Pamah, No. III.; bears an exact resemblance to that of the Cobra de Capello; but the gland in the Bodroo Pam resembles that of the Katuka Rekula Poda.

The four first figures show different views of the poison gland of the Cobra de Capello.

Figure 1, is a side view of the head, from which the common integuments are alone removed; the poison gland, which is situated between the eye and angle of the lower jaw, is seen through a semitransparent, membranous, fascia. This fascia is connected with the muscles at the angle of the lower jaw, and is attached to the bones of the head, at the anterior part of the gland.

The poison duct passes from the anterior part of the gland immediately below the orbit, till it comes opposite to the root of the fang, and there enters the inside of the mouth; it is covered by a muscle, the fibres of which are principally transverse.

The upper part of the poison gland is covered by a large, strong, semilunar, muscle, adapted to the shape of that part of the gland; which muscle arises from the bones of the skull, and is inserted into the covering of the gland, at its lowest posterior part.

By these different muscles, the gland is compressed as well as the duct, so as to expel the poison, with a certain degree of velocity.

Figure 2, represents another view, in which the fascia is removed, and the gland, with its duct, as well as the muscle surrounding its upper part, are more distinctly seen.

Figure 3. A view of the under surface of the gland, and of the poisoning fangs, with the membrane in which they are inclosed. To show these parts, the head is necessarily reversed.

Fig.1.

Fig.2.

Fig.3.

Fig.4.

Fig.5.

Fig.6.

Fig.7.

Figure 4. A view of the under surface of the gland and duct completely laid bare as far as the termination of the duct, at the root of the fang. The membrane which incloses the fang is also removed, to expose the subsidiary teeth; these are only connected by soft parts, and are moved forwards into the socket to replace the fang when it has been pulled out.

Figures 5, 6, and 7, represent three views of the poison gland of the Katuka Rekula Poda.

Figure 5. In this view the gland is scarcely seen, on account of a fascia which covers it. The muscle that acts upon this fascia, lies behind the angle of the lower jaw, and its tendon is distinctly seen connected with the fascia.

Figure 6. The gland and duct are completely exposed, putting on a very different appearance from that of the Cobra de Capello.

Figure 7, represents a view of the subsidiary teeth, and their relative situation to the fangs and the membranes in which they are inclosed.

DIRECTIONS TO THE BOOKBINDER.

The Plates No. I. to XLIV. inclusive, to be placed at the end of the descriptions, after page 50.

Plate XLV. - - - - to face page 89.

—— XLVI. - - - - - - 90.

A

CONTINUATION

OF AN

ACCOUNT OF INDIAN SERPENTS;

CONTAINING

DESCRIPTIONS AND FIGURES,

FROM

SPECIMENS AND DRAWINGS,

TRANSMITTED FROM VARIOUS PARTS OF INDIA,

TO

THE HON. THE COURT OF DIRECTORS OF THE EAST INDIA COMPANY,

AND PUBLISHED BY THEIR ORDER, UNDER THE SUPERINTENDENCE OF

PATRICK RUSSELL, M.D. F.R.S.

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1801.

THE

EDITOR'S PREFACE.

THE present Fasciculus is the first of a projected Continuation of an Account of East Indian Serpents, begun in the Description of the Coromandel Collection lately published.

The Court of Directors considering it proper that an attempt should be made to complete the account of those pernicious animals, by inviting and encouraging research to be extended over the whole of British India, was pleased to transmit instructions to the Presidencies abroad, pointing out in detail the most probable means of success; and to render the conveyance of specimens, drawings, or other communications relative to Serpents, more easy, and less precarious, it was regulated they should be sent home, addressed to the Directors.

In these instructions, it was specially recommended to procure and send to the India-House, specimens in spirits, descriptions, and coloured drawings, of all such Serpents as were not comprehended in the Coromandel Collection; and that the Medical Board should be instructed to solicit the free communication of the cases of venomous bites, which future experience might furnish; as likewise the result of experiments made for discovering the properties of the poison, and the effects of medicinal applications.

An accurate discrimination of noxious from harmless Serpents, serves at the same time to lessen the prevalent terror of their poison, and to assist decision on the comparative merit of remedies employed: and whatever improvements may be expected in the medical treatment, must be ultimately established on the aggregate of facts gradually collected from extensive experience.

Descriptions and drawings, from living or recent subjects, made on the spot, are, no doubt preferable for ascertaining the species, to descriptions made from specimens preserved in spirits. But the former are not to be always expected. Of persons in India disposed to furnish specimens, some may harbour an aversion to handling even the dead reptile; others, through

diffidence, may be unwilling to undertake a technical description: in either case, a well preserved specimen, with the aid of a few circumstances which may be easily collected, will answer the purpose.

The circumstances alluded to, are the following: the name of the Serpent in the vulgar language of the country; if rare, or common; its colour; its repute among the natives; the usual consequence of its bite; and what remedies are employed. The colour may sometimes be described in words; but, in many instances, the variegations can hardly be conveyed without the aid of a coloured figure: which, in cases where a better drawing cannot be procured, will render a mere sketch tolerably coloured, an acceptable substitute.

The Editor is led to insist on the advantage of drawings made in India, from the embarrassment he experienced in describing some of the subjects in the present Fasciculus, of which specimens only had been received, and where the change produced by the spirits, left the colour, in a great measure, to be decided by conjecture. To the Naturalist accustomed to specific characters reckoned less inconstant, a minute description of colour may be less requisite; but in common use, it will ever remain a material circumstance. In some hundreds of living Serpents which I had occasion to examine in India, the colour in individuals of the same species was found to vary less than the number of scuta or squamæ; and seemed to be less influenced by size, age, or situation, than I had been taught to expect: the tints were more or less vivid; the skin more or less glossy; but fillets, rings, and, in their general form, even spots, were found to maintain a characteristic similarity.

On a presumption, that having it sooner known in India what specimens had been received, might prove an encouragement for new contributions, the publishing in Fasciculi has been adopted, in preference to waiting till a number of specimens sufficient for a complete volume should be collected. But the promiscuous arrangement of the subjects of different genera, unavoidable in that mode of publication, will require a systematical index; in which also the Serpents of the Coromandel Collection are intended to be included: with as many of the native synonima of the whole, as can be procured. It is for this reason requested, where any of the subjects in the above collection, or in the published Fasciculi, happen to be met with under different names, that the new name may be transmitted for insertion in the projected index.

Besides the Serpents exhibited in the present Fasciculus, several have lately arrived from Bombay and Madras, and intelligence of several others has been received from sundry places, which may be expected in due time. A second Fasciculus may probably, therefore, appear early next year.

Where a specimen comes accompanied with a description and drawing, the Editor's duty will be restricted merely to correcting the press: nor will more be required for such facts or experiments as may be communicated in a form for immediate publication. In regard to medical cases of persons bitten, if related at length, it is proposed that brief mention of them should only be made in the Fasciculi; reserving the detail for an Appendix, where they can be arranged more advantageously for comparison with similar cases already collected. Of this kind, which justly deserve to be preserved, several have lately appeared in the India Newspapers, and in the printed correspondence of the Physician-General at Madras.

A description of the poisonous apparatus in Serpents, as also the result of some experiments made in India on their poison, may be found in the Coromandel Collection; and, to avoid repetition, the Editor takes the liberty of referring for other preliminary matters, to the Preface of that work, which is equally adapted to the present Continuation.

To conclude: it is with singular satisfaction he has remarked the subject of Serpents, within these last three years, to have been revived in India; and, from the abilities of many Gentlemen at present in that country, he is disposed to indulge strong hopes that the favourable opportunity now offered by the Court of Directors, will not be allowed to pass away unregarded; that inquiries will continue to be prosecuted with spirit; and that a too long neglected branch of Indian Natural History may soon, by united exertions, be highly improved: an event no less interesting to other tropical climates, than to the territories of the East India Company.

London, August 20th, 1801.

INDIAN SERPENTS.

No. I.

COLUBER.

Abdominal Scuta 185
Sub-caudal Squamæ 59 } 244

Coluber Naja, Linn. Syst. Nat. p. 382.

THE hooded snake, or Cobra de Capello, of the East Indies, generally reputed the most dangerous of the serpent tribe in that country, has of late been so amply treated of, in the Account of Coromandel Serpents, that referring to that work for a description of the Cobra, as also for the result of various experiments on its poison, it may be sufficient at present to offer some remarks of another kind, omitted before, on account chiefly of the want of an explanatory drawing, which my painter in India, (a native,) attempted unsuccessfully to execute.

The figure now presented is a sketch from life, by an English artist in Bengal, and exhibits the Cobra preparing for combat: his head and neck erected in a curve, resembling a swan's neck, are firmly supported by the convolutions of part of the trunk and the tail, while the hood is partially, not fully, expanded.

The gentleman to whom I am obliged for the drawing,* favoured me at the same time with the following remark.

" When the Cobra de Capello has raised himself for combat, he makes a full inspiration, by which the whole body being inflated, the scales are separated from each other, and the interstitial skin becomes visible from the head to the tail, but less and less in approaching the vent. On the succeding expiration, the body collapsing, the interstitial skin is no more visible, except on the hood and upper part of the trunk. In this manner, as the animal breathes, the body alternately swells and shrinks, but the hood and the neck remain expanded."

It may be further remarked, when the hood is expanded, the neck bent, and the nose pointing directly foreward, that no part of the head is visible to a spectator placed exactly behind: yet the head is not properly hooded, or concealed by the hood, and the scales in front, are not so much separated as on the back of the hood, which is somewhat convex.

* Mr. Alexander Russell of Bengal, a former contributor to the Coromandel Collection, and to whom acknowledgment is due for all the specimens contained in the present Fasciculus.

In the exhibition of serpents, by way of show, by strollers in India who travel round the country, the Cobra de Capello makes a conspicuous figure, and, so far as I know, is the only serpent they pretend to charm by music. It is indeed the only venomous serpent I ever remarked in their collections, though sometimes consisting of more than a dozen of different species.

These itinerants are usually provided with pretended antidotes against poison, which they vend to the spectators; and, in proof of their boasted efficacy, will allow themselves to be bitten: but in such case, the fangs of the Cobra have commonly been eradicated, and where blood is drawn, the wound has been made by the common teeth, or holders.

The showman, placed on the ground, sits squatted on his hams, holding a reeden pipe in his left hand, which he begins to sound as soon as he has taken off the cover of the round flat basket, in which the serpent lies coiled up. At the sound of the pipe, or when less alert, excited by the touch of a small rod, the Cobra raising his head, assumes by degrees the attitude in which he is represented in the Plate. Sometimes he is shaken out of the basket, which makes no difference in his subsequent movements.

The serpent being erect, the showman commences what is called the dance, by a slow movement of his body sidewise to right and left alternately; varying the measure to the cadence of his music, and sometimes rising and sinking on his hams. The serpent, with eyes intently fixed on its master, imitates his gestures, but watches particularly his right hand, which, shielded by the lid of the basket, or sometimes naked and clinched, is now and then advanced in a hostile manner, to provoke the serpent to snap. The movements of the serpent are not devoid of grace, and afford some amusement; but being unable to sustain the exercise beyond a short time, it becomes necessary, when the exhibition is prolonged, to produce a fresh performer.

It need hardly be remarked, that the music of the pipe has no influence on a Cobra in its wild state. He is trained for exhibition by a course of severe discipline, of which a circumstantial account has long since been given by Kempfer.*

That bad accidents from the bite of the mutilated snakes commonly exhibited to the public, should not be oftener heard of, has been remarked on another occasion, as surprising.† But, though rare, they sometimes happen, and may easily be accounted for.

In the Account of Coromandel Serpents, more than a score of the hooded snakes, under different appellations, are mentioned as having been examined without discovering any specific character of distinction, or difference in the malignity of their poison. Since my return, however, from India, I have heard of a small Cobra de Capello, found in the vicinity of Benares, which seems, from the description, to be specifically different from any known on the coast of Coromandel; but a specimen being expected, a further account is reserved for a future occasion.

* Amœnitates Exoticæ, p. 569. † Account of Coromandel Serpents, p. 88.

OBSERVATIONS.

I have before had occasion to remark, that the natives on the coast of Coromandel, distinguish a number of varieties of the Cobra de Capello, by different names; but that I had found the distinctive characters extremely vague.*

The mark in the hood of the Coromandel *Coodum Nagoo*, is indeed very different from that of the others; but slight variations, both in shape and colour, are met with in all of them.

The *hood* of the Sankoo Nagoo is plain, without any mark. From the specimen now in the Museum of the late Mr. John Hunter, it appears that Seba was mistaken in conceiving the want of the spectacle-mark to be a specific character of the female serpent.† I am led to repeat this remark on observing that the mistake of Seba has been adopted by the Count de la Cepede in his Continuation of Buffon's Natural History.‡

Laurentius has made it a distinct species, calling it Naja non Naja.

In Gmelin's edition of Linnæus, the three following varieties of the Coluber Naja are adopted from Laurentius, and references made to the figures in Seba's Thesaurus.

1 Naja fasciata Seba Thes. Vol. II. Tab. 89. f. 3.
2 Naja Siamensis, ib. - - - - - - - - - - f. 1, 2.
3 Naja Maculata ib. - - - - - - Tab. 90. f. 2.

The Naja Brasiliensis of Laurentius, Seba, p. 96. Tab. 80, f. 4, is, by Gmelin, made a new species under the name *Rufus*.

The figure on the hood of that serpent, is certainly different from the others; but if sufficient to constitute a distinct species, would not the Coromandel Coodum Nagoo have the like pretension?

The two hooded snakes in Seba, the one from Peru, Thes. Vol. II. Tab. 85. f. 1, the other from New Spain, Tab. 97. f. 4, are treated of separately by Cepede, on a supposition that the skin of the neck was not (as in the other species) capable of expansion. But this can hardly be inferred from the words of Seba, " non huic majus ac cuicunque vulgari serpente tumet *collum*." Which may be equally said of *all* hooded snakes, when their necks are in a collapsed state.

As to the Cobra from Peru, in Seba, Tab. 85. f. 1, a more particular description is found in Gronovius.§ It has 193 Scuta, and 62 Squamæ; and I should think there is no ground for suspecting it differs materially from the Cobra de Capello of the East Indies. The same may be said of Seba's serpent from New Spain, Tab. 97. f. 4: by the way, the description of the mark on the hood of that serpent, (p. 103,) by no means agrees with the figure referred to.

It appears upon the whole, that the hooded snake is a native of the new, as well as of the old continent.

* Account of Coromandel Serpents, p. 7.
† Ibid. p. 9.
‡ Histoire Naturelle des Serpens, Tome II. p. 89. Paris 1789.
§ Zoophylacium, p. 20. No. 96.

No. II.

COLUBER.

Abdominal Scuta 209
Sub-caudal Squamæ 129 } 338

Called by the natives, *Kalla Jin.*

The *head* broader than the neck, depressed, thin, ovate. The principal laminæ twelve in number. The one in front trigonal, somewhat emarginate; the pair between the nostrils, orbicular; the next pair square, and larger; the central lamina between the eyes, small, trigonal, with a singular cordate appendage; the lateral laminæ large, oblong-ovate; the posterior pair semicordate with a pretty large lamina on each side.

The *mouth* large. The lower jaw a little shorter than the upper. A double row of palatal teeth, and a marginal row, above; no fangs: the under teeth as usual.

The *eyes* lateral, nearer the rostrum than the angles of the mouth, large, oval. The nostrils lateral, very near the point of the rostrum.

The *trunk*. The neck small, round; the back convex, the sides towards the scuta compressed, the abdomen flat. The *tail* tapers to a very small, sharp, point. The scales ovate, smooth, imbricate: but those next the scuta, are larger and somewhat angular.

The entire *length* of the subject two feet ten inches, of the tail nine inches; circumference of the neck eleven lines, of the body one inch and a half.

The *colour*. This animal is singularly and beautifully speckled. The orange colour marks on the upper part of the polished black head, give it a resemblance to some species of beetle. Along the ridge of the back, from the neck to the end of the tail, is a row of orange yellow, crucial, spots, with oblique rows of short, straw-colour lines on each side. The ground colour is black. The scuta are of a yellowish white, with a black dot on each side of the margins.

OBSERVATIONS.

Allowance must be made in the colour, for change produced by the spirits; the specimen not being accompanied with a drawing.

In the second Volume of Seba's Museum, this serpent seems to be described in two places. In p. 7. Tab. 7, under the name of Ibiboboca, from Brasile; and in p. 60, Tab. 61. "Serpens Ceilanica pomposâ veste ornata."

No. III.

COLUBER.

Abdominal Scuta 151
Sub-caudal Squamæ 93 } 244

Called by the natives *Dooblee.*

The *head,* a little broader than the neck, oblong-ovate, compressed. The two anterior laminæ between the nostrils trigonal; the next pair square, rounded behind; the middle lamina between the eyes lanceolate, those on the sides conical, convex; the semi-cordate lamina well shaped, large.

The *mouth* proportionally large. A marginal row of teeth above; no fangs.

The *eyes* large, orbicular. The *nostrils* small, very near to the point of the rostrum.

The *trunk* round, well shaped. The *tail* tapering, becomes very slender, and terminates in a long, sharp point. The scales, on the back ovate, carinate, on other parts smooth.

The *length* thirteen inches; of the tail, four inches.

The *colour* of the head light brown; the trunk freckled with dusky yellowish spots; the scuta a yellowish white, and most of them with black margins.

No. IV.

COLUBER.

Abdominal Scuta 154
Sub-caudal Squamæ 67 } 221

Called by the natives *Chittee.*

The *head* oblong-ovate, hardly broader than the neck, obtuse, flattish on the crown, compressed on the sides. A single triangular lamina between the nostrils; the next pair orbicular, the middle lamina between the eyes broad, shield-form, the lateral conical and slightly convex; the semicordate pair sub-truncate, with an oblong lamina on each side.

The *mouth* middle size. A marginal row of teeth in the upper jaw; no fangs.

The *eyes* large, lateral, sub-oval. The *nostrils* small, on the edge of the rostrum.

The *trunk.* The neck and body round, swells towards the middle, and, as usual, gradually diminishes towards the anus; but the *tail* tapering rapidly, ends in a sharp point.

The *scales* smooth, ovate.

The *length* of the subject one foot seven inches; of the tail three inches, and three-fourths.

The *colour*. The crown of the head, and upper parts of the body, appear uniformly of a bluish clay colour; the belly of a tawny buff.

No. V.

COLUBER.

Abdominal Scuta 135
Sub-caudal Squamæ 73 } 208

Called by the natives *Dora*.

The *head* a little broader than the neck; oblong, obtuse, compressed on the sides. The laminæ between the nostrils small, conical, the next pair orbicular; the middle lamina between the eyes oblong, acuminate, the lateral sub-conical, convex; the semi-cordate pair well shaped, rather large.

The *mouth* moderate size; a marginal row of teeth above; no fangs. Two front teeth in the lower jaw remarkably large.

The *eyes* small, globular. The *nostrils* close to the rostrum, small.

The *trunk*. The body round, regularly shaped; the *tail* rather thick, tapering to a sharp point. The scales ovate; on the back, in several series carinate, on other parts smooth.

The *length* of the subject described two feet two inches; of the tail seven inches and a half. Circumference of the neck, one inch and a half; of the thickest part of the trunk two inches and a half.

The *colour*. The head of a clay colour; the body much darker, and variegated with dusky-yellowish spots. The scuta and squamæ a yellowish-white.

No. VI.

ANGUIS.

Squamæ Abdominales 323
Squamæ Sub-caudales 46 } 369

Called by the natives *Kerril pattee*.

The *head* very small, oblong, obtuse, slightly convex on the crown, flattish on the sides. The principal laminæ ten in number. The first, in front, trigonal, the point inserted between the next pair, which are oblong, square, and perforated by the nostrils; next to these a sub-orbicular pair; the central lamina of three between the

eyes, orbicular with a sharp point; those on the sides oblong; the posterior pair rudely semicordate, and deeply divided at the base by the point of the central lamina.

The *mouth* wide, the jaws of equal length. One, or more, very minute fangs are found on each side of the upper jaw, situated in the usual place. There are no marginal teeth; and the palatal, as well as the teeth in the under jaw, are remarkably small.

The *eyes* lateral. The *nostrils* almost vertical, round.

The *trunk*. The neck slender, hardly broader than the head, round, long; the back rounded, the sides declivous, the belly carinated; the trunk grows gradually thicker, till near the anus, where it diminishes a little. The *tail* short, flat, round pointed, the edges very thin. The scales imbricate, oval on the upper part of the neck, and smooth; on other parts carinate; on the back ovate, on the sides and belly orbicular: the abdominal and subcaudal scales inconsiderably larger than the others.

The *length* three feet four inches; of the tail four inches and a quarter. Circumference of the head one inch three lines; of the neck one inch and a half; of the thickest part of the body three inches three-fourths; two inches from the vent, two inches one-third.

The *colour*, olive green above, yellow beneath, with 58 black, or dark-blue bands on the trunk, and nine on the tail. These bands completely encircle the body, but are broadest on the ridge of the back, narrowing towards the belly.

OBSERVATIONS.

A fowl bitten in the thigh, very soon became disordered; it drooped its head, and within a minute and a half showed other signs of infection; at the end of five minutes, it was seized with convulsions, and in two minutes more expired: that is, in seven minutes after the bite.

This Anguis, and the four which immediately follow, were brought to Calcutta from the salt water rivers which intersect that part of Bengal called the Sunderbunds.

They were observed to be very alert and nimble while in water, but moved slowly on dry ground. Those who brought them, appeared ignorant of their being venomous. They said they were found only in salt water; that they soon die, when taken out of the water; and even in fresh water can survive but a short time: they added, probably with a view of enhancing the price, that they were very rare.

I must remark here, that all the specimens in spirits from Calcutta, being carefully put up, were received in good preservation, and four of them were accompanied with coloured drawings.

No. VII.

ANGUIS.

Squamæ Abdominales 332
Squamæ Subcaudales 40 } 372

Called by the natives *Shootur sun.*

The *head* hardly thicker than the neck, extremely small, oblong, flattish on the crown and sides, obtuse. The larger laminæ twelve in number. One in front trigonal, convex, the pair next behind, oblong square, and perforated by the nostrils, the next pair orbicular; the central lamina between the eyes broad, pentagonal; the lateral, small, roundish; the semicordate pair long, with a thin lamina near the point, on each side.

The *mouth* large; the jaws of equal length. A small fang was found in the upper jaw, on each side, with three common teeth immediately behind them, disposed rather obliquely, in respect to the palatal rows. The rest of the teeth very minute, curve, reflex.

The *eyes* orbicular. The *nostrils* nearly vertical.

The *trunk.* The neck extremely small, long, round; the body disproportionately thick, the sides declivous, the belly carinate. The tail flat, somewhat curve, round pointed. The scales carinate, imbricate; ovate on the back, on other parts orbicular, those on the carina of the belly not larger than the others.

The *length* three feet eleven inches; of the tail four inches and a half; of the head, three fourths of an inch. Circumference of the head, one inch; of the trunk, where thickest, (in its collapsed state) four inches three-quarters.

The *colour*, a dark blue, intermixed with green. The neck crossed with bands of greenish yellow; and broader bands of the same colour across the sides and the tail.

OBSERVATIONS.

In the dimensions of this and the other subjects, allowance must be made for the change produced by the spirits.

A small specimen, measuring in length, one foot two inches one-fourth accompanied the large one. It was in every respect completely formed, and coloured like the mother; and one of nine which Mr. Russell found on opening her belly, each contained in a distinct egg.

The common teeth behind the fangs, in this and the three following subjects, is a very remarkable circumstance. The only instance I have ever met with of a similar anomaly in the teeth, was in the Boa, No. III. of the Coromandel Collection.*

* P. 3. The position of the teeth is distinctly shown in the Anatomical Plate, No. XLV. of that work.

No. VIII.

ANGUIS.

Squamæ Abdominales 338
Squamæ Subcaudales 48 } 386

Called by the Natives *Kalla Shootur Sun.*

The *head* small, a little broader than the neck, ovate, flattish on the crown and the sides. The front lamina trigonal; the pair perforated by the nostrils oblong, large; the next pair smaller, sub-orbicular; the central lamina between the eyes, short, resembling the point of a lancet; the lateral oval; the semicordate pair narrow, deeply cleft at the base, and several laminæ on each side.

The *mouth* wide; the under jaw somewhat shorter than the upper. There is a small fang on each side of the upper jaw, behind each of which, in a line more parallel to the palatal rows than in the preceding subject, are three common holders. The rest of the teeth are curve, as usual, but very small.

The *eyes* high, small, orbicular. The *nostrils* nearly vertical, large.

The *trunk*. The neck slender, round, swelling gradually into the body, which is rounder, and more proportionally shaped than any of the angues described in the present fasciculus; the back convex, the sides declivous, the belly carinated. The *tail* more curve and obtuse, than in the others, and much thicker in the middle, but the margins thin, as in them. Most of the *scales* carinated; on the neck oval, on other parts ovate, or orbicular, all imbricated: those on the belly not bigger than the rest.

The *length*, three feet eleven; of the tail, five inches and a half; of the head, three-fourths of an inch. Circumference of the head, one inch.

The *colour*. The neck a bluish black, with yellow bands; the back likewise of a bluish black, but some shades lighter; the sides and belly, yellow, encircled by faint darkish bands, to the end of the tail.

REMARKS.

No drawing accompanied the specimen of this serpent, and allowance should be made for alteration of colour produced by the spirits.

No. IX.

ANGUIS.

Squamæ Abdominales 308
Squamæ Subcaudales 48 } 356

Called by the natives, *Chittul.*

The *head* small, in proportion to the length of the animal, hardly broader than the neck, oblong, roundish, obtuse. The front lamina trigonal; the first pair oblong-square, large, and perforated by the nostrils; the next pair sub-orbicular; the central lamina between the eyes lancet-form; the lateral sub-oval; the semicordate pair ill shaped, with some large scales on the sides.

The *mouth* small for the size of the subject. There are small fangs in the upper jaw, and behind them are four common holders, placed, as in the preceding, less obliquely than in No. VII.* The teeth are very slender and short.

The *eyes* high, small, orbicular. The nostrils on the verge of the declivity of the obtuse rostrum.

The *trunk*. The neck round, nearly of equal thickness; the body more round than in any of the preceding angues, till within ten inches of the anus, when, as in them, it becomes compressed; the belly is not carinated till near the tail. The *tail* flat, but shorter and less curve than in the others. The *scales* small, smooth, imbricate; orbicular on the sides, on other parts ovate; but those on the belly are orbicular with ciliated margins, and, in comparison with the other angues, much larger in size.

The *length* five feet; of the tail five inches; of the head one inch and a half. Circumference of the head two inches and a quarter; of the neck one inch and a half; of the trunk, where thickest, four inches and a half.

The *colour*, blue, with circular bands of yellowish white.

OBSERVATIONS.

A fowl bitten in the thigh by this serpent, expired in eight minutes.

* Vide p. 8.

No. X.

ANGUIS.

Squamæ Abdominales 306
Squamæ Subcaudales 52 } 358

Called by the natives *Hoogli pattee.*

The *head* oblong, obtuse, bulges behind, and thicker than the neck. The front lamina small, but trigonal as usual; the next pair, perforated by the nostrils, oblong, remarkably large; the pair immediately behind similar in shape, but placed obliquely, and receiving between them the point of the middle oval lamina, of the three between the eyes; the lateral sub-lunate; in the centre of the semicordate laminæ, there is an uncommon oval one divided longitudinally, which, having been observed in several subjects, would appear to be not accidental.

The *mouth*, proportionally large. In the upper jaw, on each side, there is a small poison fang, behind which, placed obliquely (as in No. VII.*) are two or three common teeth. The palatal rows, and the teeth in the under jaw are small.

The *eyes* oval. The *nostrils* gaping.

The *trunk*. The neck roundish; the back rounded; the sides declivous, compressed; the belly carinate. The *tail* flat, curve, round pointed, the edges very thin. The *scales* ovate; on the back carinated and imbricate; on the sides smooth, orbicular, contiguous, on the carina of the belly smooth, small, ovate, imbricate.

The *length*, three feet and half an inch; of the tail five inches; of the head one inch two lines. Circumference of the head one inch eight lines.

The *colour* of the head, back, and tail, blue; the sides and belly pale buff.

OBSERVATIONS.

A fowl bitten in the thigh, by this reptile, expired in five minutes.

* Vide p. s.

No. XI.

ANGUIS.

Squamæ Abdominales 318
Squamæ Subcaudales 45 } 363

Called by the Natives *Valakadyen.*

The *head* oblong, compressed, equally thick with the neck behind, but contracting as it projects into the obtuse rostrum. The front lamina (usually trigonal) is here round; the pair immediately behind large, pyramidal, perforated by the nostrils; the next pair nearly of the same shape, placed obliquely between the eyes and the nostrils; the central lamina of the three between the eyes, small, round; the lateral broad; the semicordate pair well shaped on one side, on the other lacerated: the occiput covered with small orbicular scales, each having a raised point in the centre.

The *mouth* wide; without fangs; the teeth above and below extremely small. The *eyes* small, orbicular, high, lateral. The *nostrils* vertical, ringent.

The *trunk* cylindrical, of equal thickness throughout, or swelling a little at the middle. The *tail* short, double-edged, sword-form. The *scales* small, orbicular, hexagonal or oval; in most parts rather contiguous than imbricated; each scale has a small raised point in the middle.

The *length* three feet three inches, of which the tail claims four inches and a half.

The *colour*. The head and trunk above, a bluish gray; the abdomen yellow; the whole of the tail of the same colour with the head.

Received from Tranquebar.

OBSERVATIONS.

Though this serpent has no venomous organs, its bite is represented by the natives as infallibly mortal, if proper remedies are not instantly applied.

The present, and the two subjects immediately following, as well as the last five subjects in the First Part of the present Collection, properly belong to the new genus *Hydrus*, some years ago instituted by Mr. Schneider,* and adopted by late naturalists. I have, however, though approving of the new genus, adhered to the Linnean classification, for the sake of uniformity; reserving the alteration for an intended classical index.

The genus Hydrus is thus defined by Mr. Schneider, "Corpus anterius gracile, "sensim crassescens, squamosum. Cauda anceps. Body slender in front, gradually "thickening, squamous. Tail (compressed) two-edged."

* Schneider, Amphib. Jena, 1799.

To this definition the several subjects alluded to above agree in general; but I do not comprehend how the serpents No. XVII. XX. XXX. and XXXIII. of the Coromandel Collection, came to be placed by Mr. Schneider in the genus Hydrus; seeing all the four want the characteristic tail, and none of them possess the general habitus. In regard to two of them, No. XX and XXXIII, Dr. Shaw expresses his opinion that they are not very properly stationed in that genus.*

No. XII.

ANGUIS.

Squamæ Abdominales 228
Squamæ Subcaudales 38 } 266

Called by the natives *Shiddil.*

The *head* not thicker than the neck, small, short-ovate. The first pair of lamina square, rounded at the corners, and perforated by the nostrils; the next pair small round; the centre lamina between the eyes oval; the lateral cordate; on each side of the semicordate laminæ are several large scales.

The *mouth* narrow, the jaws of equal length. There are no fangs; the teeth very small. The *eyes* high and globular. The *nostrils* large, nearly vertical.

The *trunk* cylindrical to near the tail, where it becomes slightly compressed. The *tail* short, flat, and curve. The *scales* on the occiput and part of the neck, smooth, on the body carinated, and being arranged lozen-wise the carina present as many parallel ridges on the trunk and the tail as there are rows of scales. There is little difference in point of size, of the middle abdominal scales and those on other parts.

The *length* one foot and a half, including the tail, which measures only two inches.

The *colour* buff, with broad rings of black, or dark blue, from the neck to the tip of the tail, which is black. Between the rings on the back, but not on the abdomen, faint darkish spots are interspersed.

OBSERVATIONS.

This serpent was also received from Tranquebar, and its bite is held by the natives to be dangerous though not mortal. It produces, as they pretend, a burning heat over the whole body. It certainly has no venomous apparatus.

* Zool. Vol. III. p. 569, 570.

No. XIII.

ANGUIS.

Squamæ Abdominales 244 }278
Squamæ Subcaudales 34 }

Called by the natives, *Kadell Nagam.*

The *head* very small, hardly thicker than the neck, oblong, cylindrical; the fore part covered with laminæ, the rest with small, orbicular, contiguous scales. The front lamina round, with a sharp point inserted between the first pair, which are perforated by the nostrils; the next pair small, round; the three laminæ between the eyes nearly of a size, the middle one ovate, accuminated; the semicordate pair narrow with a broad scale on each side at the point.

The *mouth* small, the upper jaw longer than the under. There are no fangs. The *teeth* minute. The *eyes* globular, and very small. The *nostrils* vertical.

The *trunk*. The neck enormously slender and long, covered above with small orbicular scales; but underneath there is a series of about forty or fifty scales somewhat larger; those which succeed are of the same size with the other scales. From the long neck, the body swells and lessens proportionably, but is more compressed as it approaches the tail, which is short, flat, and two edged.

The *length* two feet nine inches; of which three inches belong to the tail.

The *colour* light blue, with cross yellow bands, more especially on the neck and the tail; the belly of a lighter yellow, with faint blue bands.

Received from Tranquebar.

OBSERVATIONS.

The bite of this serpent is reputed by the natives to be not less dangerous than that of the Cobra de Capello; but the absence of poisonous organs sufficiently shows the notion to be a popular error.

It is remarked by the Rev. Mr. John, to whom I am obliged for the present and the two preceding specimens, that he never found a land, a river, or a tank snake with a flat tail. Such as are sometimes found in rivers, have been brought in by the tide, and can live only a short while out of salt water. He remarks further, that it is very difficult to procure sea snakes; for though often caught in the nets, they are held in such dread by the fishermen that hardly any inducement can procure their preservation: they are first bruised on the head with a billet, and then returned into the water. The Moolagoo Pam (Talla Pam, No XLIV. Corom. Serp.) he says, is often cast on shore by the surf, but rarely any other of the flat tailed snakes.

No. XIV.

COLUBER.

Scuta Abdominalia 144
Squamæ Subcaudales 82 } 226

Called by the natives at Bombay, *Ourdia*.
at Calcutta, *Dora*.

The *head* oblong-ovate, somewhat thicker than the neck, and compressed towards the nose, the fore part covered by nine laminæ. The first pair separating the nostrils small, pyramidal; the next large, square, rounded behind; the central lamina between the eyes long, and rather narrow, those on the side conical, convex; the semicordate pair ample, with several large, smooth scales, on each side. The occiput covered with small orbicular scales.

The *mouth* proportionably small; there are no fangs; the marginal row above, as well as all the other teeth, remarkably short. The *eyes* globular. The *nostrils* very small.

The *trunk* swells and diminishes moderately; but the tail tapers to a fine point. The scales on the neck and on part of the tail smooth; on the back and sides ovate and carinated; a row of broader, smooth scales, next to the scuta.

The *length* three feet seven inches; of which the tail measures eleven inches.

The *colour* of the head light chesnut; from each orbit proceed two remarkable bluish-black streaks, of unequal length; the shorter descends obliquely to the mouth the other creeping obliquely along the cheek and the occiput, makes a turn upward to be united with a spot of the same colour on the neck. The back and the sides are also of a bluish-black colour, with dusky-yellow patches every where interspersed. The belly and underpart of the tail are of a yellowish white.

OBSERVATIONS.

The subject described was received from Bombay. Specimens of various sizes have been since received from the same place, as well as from sundry other parts, but without the country names. They varied in colour, being more or less dark, and in the spots being more or less yellow or white; but the streaks from each orbit were conspicuous in all of them.

It would seem that this species is common. In the different stages of its growth, as well as at different places, it has obtained distinct names; circumstances in which it is not singular: but the variation in colour in young and old subjects is rather more than usual; for which reason I have in the following plate given the figures of two of smaller size.

No. XV.

COLUBER A.

Scuta Abdominalia 146
Squamæ Subcaudales 82 } 228

Called by the natives at Tranquebar, *Neer Pamboo.*
at Calcutta, *Dooblee.*
at Bombay,

The *length* one foot two inches and a half, of which the tail measures three inches three-fourths.

The *colour* a dusky lead, with numerous black dots on the back and the sides. The abdomen and under part of the tail white.

COLUBER B.

Scuta Abdominalia 143
Squamæ Subcaudales 83 } 226

Called by the natives at Tranquebar, *Neer Pamboo.*
at Bombay,

The *length* one foot two inches, of which the tail measures three inches four lines.

The *colour* here is less dark, and more spots of dusky yellow are interspersed than in the last subject. Besides the two black lines from each orbit, two specks on the semicordate laminæ are found in both the above subjects, as in all of the same size which I have seen; but not always in larger subjects.

It were superfluous to enter into a more detailed description, after that given of the *Ourdia*, to which species both certainly belong.

OBSERVATIONS.

Under the name Neer Pamboo, two other serpents, very different from the *Ourdia*, have been received from Tranquebar.

The one, the *Karoo Bokadam*, No. XVII. Coromandel Serpents.

The other *Chittee*. Continuation of Indian Serpents, No. IV.

The tail, in this species, would seem to be peculiarly liable to injury. In subjects of a foot in length, it is hardly at the tip thicker than a hair; and in a dozen of specimens of various sizes, the tail was generally found not entire: a circumstance I the rather notice, as it may obviate error in reckoning the subcaudal squamæ.

No. XVI.

BOA.

Scuta Abdominalia 189
Scuta Subcaudalia 18
Squamæ Subcaudales

Boa Johnii.

Called by the natives *Erutaley Nagam.*

The *head* small, round, short, obtuse; covered with small, round, contiguous scales, except on the declivous front, where three pair of small laminæ may be remarked. The first thick and trigonal; the next between the nostrils square; the third pair oblong, and placed obliquely; the common scales between the eyes a little bigger than those on the crown and the occiput.

The *mouth* small and narrow, the upper jaw projecting beyond the under. There are no fangs; the teeth above slender and short, but in front of the under jaw somewhat longer. The *eyes* small, globular, placed near the crown. The *nostrils* high, separated by the second pair of laminæ.

The *trunk* round, for the most part nearly of equal thickness, or swelling a little till within three inches of the vent, where it is thickest, but soon resumes its former size, which it maintains, hardly tapering, to the end of the tail. The obtuse point of the tail resembles the head, and in point of thickness sometimes exceeds it. The scales mostly small, orbicular, smooth, in some places contiguous, mostly imbricated. On each side of the scuta, there is a double row of scales, larger than the dorsal. The scuta broad, and with little diminution in size, are continued on the short tail till within an inch of the point, where they are succeeded by ordinary round scales.

The *length* two feet six inches; of which three inches belong to the tail.

The *colour*. The head, back, and upper part of the tail of an uniform darkish brown; the abdomen of a much paler brown, with more of a reddish cast.

OBSERVATIONS.

The figure was drawn exactly from the specimen received; but from the stricture and distortion of the subcaudal squamæ, where the scuta terminate, I was led to suspect that the nipple-form end of the tail was an accidental deformity. The suspicion has since been confirmed by two different drawings made in India, and I choose therefore to refer to No. XVII. (a small specimen of the same species) for a more correct representation of the tail, which from the resemblance of its point to the head, has obtained for the serpent the name of double-headed.

Captain Hardwick (lately arrived from Bengal), among many excellent drawings, has got one of this serpent; and his written description, in the number of subcaudal scuta, agrees exactly with mine. In the small specimen, however, (No. XVII.) the scuta amount to twenty-eight.

The specimen was received from the Rev. Mr. John, of Tranquebar; but the serpent is not uncommon in Bengal. In the former place, its bite is said to produce leprosy; an effect often ascribed, by the natives, to many other serpents which have no poisonous organs; at the latter, it is with more justice deemed perfectly harmless.

Mr. John preserved one of three feet, for more than a twelvemonth, in an earthen pot filled with earth, which was changed once a month. "During the whole time, he "gave it no food; and except that the thick tail was somewhat extenuated, the animal "suffered no apparent alteration. In its movements it was very slow; it generally lay "coiled up sluggishly with its head under the belly, was not easily roused, and never "showed a disposition to bite."

It may be remarked, that in the Linnean system, subcaudal squamæ constitute a generic character of Coluber, in like manner as subcaudal scuta do of Boa; "but "in some few species of Colubri, exclusive of the usual subcaudal scales, are a few "scuta, or undivided lamellæ, either at the beginning or towards the tip of the tail."* Of this anomaly, two instances (No. XXXIX. and XL.) occur in the Coromandel collection.

The general habit of the present subject is that of Anguis; but the unusual breadth of the abdominal as well as subcaudal scuta, and the number of the latter in proportion to the scales on the under surface of the tail, seem to exclude it from that genus. I have therefore classed it with the Boæ, and named it after the respectable missionary who sent me the specimens, to whom I lie under obligation for many communications.

* Shaw's Zool. Vol. III. p. 364.

No. XVII.

BOA.

Scuta Abdominalia 193
Scuta Subcaudalia 28
Squamæ Subcaudales

Called by the natives *Manedulli Pamboo.*

This small serpent, though distinguished by a different name, is merely a young subject of the species last described.

The *length* nine inches four lines; of which the tail claims one inch two lines.

The *colour* a coral red, with irregular black spots and patches on the sides, from the neck to the end of the tail.

The present subject differs from the last in colour, in the number of subcaudal scuta, and in the shape of the tail. In this last respect I consider the present figure more correct, for reasons already assigned.

OBSERVATIONS.

The colour of the figure was copied from an Indian drawing coloured from life; in the preserved specimen it had faded to a dusky white; while the spots on the back and the tail, though changed to a pale brown, remained distinctly visible.

No. XVIII.

COLUBER.

Scuta Abdomnalia 191
Squamæ Subcaudales 136 } 327

Called by the natives *Sarey Pamboo.*

The *head* thicker and broader than the neck, oblong, obtuse, flattened on the sides. The first pair of laminæ, which separate the nostrils, are round; the next pair of the same shape, but twice as large; the three between the eyes, broad; the semicordate pair irregularly shaped, and truncate.

The *mouth* wide. A complete marginal row of teeth above: no fangs. The *eyes* large and globular. The *nostrils* ringent.

The *trunk* round, compressed, remarkably slender. The tail long, and tapers to a very slender, round point.

The *length* one foot nine inches and a half, of which the tail claims five inches and a half.

The *colour*. The head cinerious above, and the white cheeks remarkably streaked with black; the neck lead colour, striped with obscure, oblique, black and white lines; but from the middle of the body to the tip of the tail, the colour is more of a bluish gray, and the black stripes more strongly marked. The scuta white, many of them with black margins; the subcaudal squamæ are still more remarkably checkered black and white.

OBSERVATIONS.

This serpent is not reputed dangerous by the natives; they nevertheless assert that its bite occasions blindness in persons aged above forty: which I consider as fabulous.

It was received from Tranquebar at the same time with the head of a large one of the same species, which measured in all six feet. The large one was considered by the Rev. Mr. John to be the Jeri Potoo No. XXXIV. of the Coromandel Collection.

He remarks further, that it is often found in company with the Cobra de Capello, and that from the sharpness of its scales it sometimes does harm to the rice grounds.

If I am not mistaken, on a superficial view, small specimens of this serpent are not rare in the English collections.

Where so remarkable a difference of colour between young and old subjects of the same species occurs, as in the foregoing instances No. XV. A, B, XVII. and XVIII. they come naturally to be regarded as distinct species, and different names are conferred on them accordingly. Hence the number in lists of serpents procured from the natives of India, far exceeds the number of existing species; the same individual in its progressive states obtaining distinct names, the species in consequence come to be fallaciously multiplied.

But however properly the naturalist may, on examination, lessen the number of species, by bringing classically together individuals before separated, yet, to all practical purposes in the country, it must ever be of material consequence (at least in respect to poisonous serpents), to collect not only the provincial names, where different languages obtain, but also the local names in the same dialect applied to different stages of the serpent's growth: for the bite of venomous serpents of every age is always in some degree noxious. The bite of a young Cobra de Capello, though not more than nine inches in length, has been known to prove fatal to a chicken in a few minutes.

No. XIX.

COLUBER.

Scuta Abdominalia 271
Squamæ Subcaudales 24 } 295

Ataligato Seba Thes. V. ii. Tab. 77. fig. 6.

Called by the natives

The *head* small, not thicker than the neck, oblong, round, obtuse, the crown rather flat. The laminæ which separate the nostrils, triangular; the next pair of a roundish shape, and twice as large; the shield-from lamina trigonal and proportionally large, the lateral very small, forming one of several scales which border the orbit; the semi-cordate pair unusually large, and intersected by the point of the shield-form lamina.

The *mouth* narrow. A fang of moderate size on each side, but no marginal row of teeth above. The *eyes* globular, and very small. The *nostrils* on the edge of the rostrum large and open.

The *trunk* cylindrical, somewhat thicker than a swan quill; a little thicker at the middle, and from an inch and a half above the vent diminishes very gradually to the tip of the short tail. The *scales* universally smooth, glistening, as if highly varnished. Those on the neck suborbicular, and rather contiguous than imbricated: on the back the scales are imbricated, and more of an ovate shape.

The *length* thirteen inches eight lines, of which the tail claims nearly one inch.

The *colour* chesnut: the scuta a dull yellow. A narrow, oblique, yellow streak from each nostril, first edges the shield-form lamina, then runs united to the nap of the neck, where it is crossed by a similar line from a yellow patch on each cheek. From the junction of these yellow lines, a chain of white scales runs straight along the middle of the back to the end of the tail, and a similar white thread runs along the side parallel to one of a chesnut colour next to the scuta. The scuta are crossed at unequal distances by narrow dark bands. The white and chesnut threads terminate at the vent; and there are no cross bands on the under part of the tail.

OBSERVATIONS.

I have hardly met with a venomous serpent of less suspicious external appearance than the present subject. The head is covered with regular laminæ, the scales are smooth, close, and varnished, and its body variegated with elegant simplicity; at the same time, it is so peculiarly marked as not to be easily mistaken.

It was received from Java in 1801, without any accompanying history or country name. It is indisputably noxious, though in what degree, or whether it grows to a larger size, are circumstances remaining to be ascertained hereafter.

The description and figure of the *Ataligato* given by Seba suit the present subject so exactly, as to admit little doubt of its being of the identical species. Seba indeed mentions it as a rare Mexican serpent;* but several other serpents, besides the Cobra de Capello, are found in the new as well as in the old Continent, or in their respective islands.

It is thus described by Seba "Pulcherrimus hic anguiculus squamis purpureis tenui- "bus per corpus supernum obsitus. Juxta dorsum protensas gerit tres albicantes "fasciolas. Venter albus annulis quasi nigris distinguitur. Perpusillum est ejus capi- "tulum; et cætera quoque longus et tenuis, rotundulus tamen et glaber conspicitur."

No. XX.

COLUBER.

Scuta Abdominalia 164
Squamæ Subcaudales 77 } 241

Called by the natives in Java

at Vizagapatam, *Boodro Pam.*

The *head* broader than the neck, swelling out behind on each side, depressed in front, and compressed on the sides of the obtuse rostrum. Close behind the trigonal lamina, which separates the nostrils, a pair of small oval laminæ is placed obliquely; the scales on the crown smooth, the rest of the head covered with small, orbicular, carinated scales: a narrow lamina above each orbit excepted.

Between the nostril and the eye, on each side, but more on a line with the eye than the nostril, an aperture is observable (similar to that found in the rattle snake) which is larger and more ringent than the nostril.

The *mouth* large. No marginal row of teeth above; but a long fang on each side, and two remarkably long holders in front of the under jaw. The *eyes* large, globular. The *nostrils* on the verge of the rostrum, very small.

The *trunk* round, slightly compressed; the *scales* ovate, carinated, imbricate; but two rows next the scuta on each side larger than the others, hexangular, and smooth. The slender round tail terminates in a fine sharp point.

The *length* one foot eleven inches, of which four inches five lines belong to the tail.

* Seba Thes. II. T. 77. f. 6.

The *colour* of the upper half a dark green, which brightening towards the tail, assumes a bluish cast; the scuta are of a yellowish green, with a bright yellow fillet on each side of the abdomen, continued down half the tail.

OBSERVATIONS.

This serpent was received from Java, in 1801, together with a large *Bodroo Pam*, and several other serpents more common on the Coromandel coast.

The present subject seems merely a variety of the Bodroo Pam, No. IX. of the Coromandel Collection; from which it varies principally in the number of subcaudal squamæ, and in the sharp, fine point of the tail.

It was in describing this specimen that I discovered a material mistake committed in my former description of the *Bodroo Pam*, in which the nostrils are represented as "wide and large, and situated near the eyes:"* while the real nostrils, situated near the point of the nose, from their smallness in the recent subject, happened to escape my notice.

This wide aperture near the eyes is similar to that found in the rattle snake, with which I was not then acquainted; and which I believe had not at that time been remarked in any of the genus Coluber, except in the yellow snake of Martinico.

To the description of the Martinico serpent by Cepede, I owe my escape from a second error, that of attributing double nostrils to the present subject; and by his remark on the singularity of the aperture, I was led, in conjunction with my friend Mr. Everard Home, to an enquiry, of which the result has lately been communicated to the Royal Society.†

No. XXI.

COLUBER.

Scuta Abdominalia	150	201
Squamæ Subcaudales	51	

Called by the natives

The *head* cordate, considerably broader than the neck, depressed; the rostrum, which is rather pointed than obtuse, compressed near the point. The anterior pair of laminæ small, trigonal; the next, twice as large, but round; the shield-form lamina well shaped, the lateral truncate cones slightly convex; the simicordate pair broad and short: small, orbicular, contiguous scales cover the occiput.

* Coromandel Serpents, No. IX.

† Phil. Transact. 1804. Part I. p. 70.

Between the rostrum and the eye, situated as in the Bodroo Pam, there is a ringent aperture on each side, considerably larger than the nostril.

The *mouth* wide. The fangs visible one each side, remarkably long. No marginal row above, and the palatal row, as well as the teeth in the under jaw, unusually small. The *eyes* globular. The *nostrils* very small, placed at the base of the front lamina.

The *trunk*. From the head to the end of the tail carinated, the sides, which at first are compressed, dilate as they approach the flat, or plain abdomen. The *tail* taper rapidly to a small sharp point. The *scales* ovate, smooth, imbricate.

The *length* twelve inches and a half: the tail two inches two lines.

The *colour*. The upper part of the head brown, with a cineritious fillet on both sides running obliquely from each orbit along the occiput. The general colour cineritious, with many round or oval dark spots, of which thirty-three pair may be counted from the hind head to the end of the tail: some of the spots have ragged edges, and each pair nearly joins at the dorsal carina. The white abdomen is strewed with dusky dots and short lines: and next to the scuta on each side there is a row of small, dusky, round spots, which grow fainter and fainter as they approach the tail.

OBSERVATIONS.

This serpent also was received from Java, without name or memoranda relative to its history.

It affords another instance of a venomous serpent with large laminæ on the head, and scales on the trunk not carinated. Of the former, Cepede had met with no example except in the Coluber Naja. "Je n'ai vu que sur la tête du Naja les neuf grandes écailles "qui garnissent celle de la plupart du Couleuvres ovipares et non venimeuses."* Considering the number of serpents Cepede examined, this remark deserves particular notice. He afterwards, however, found a second instance in the Coluber Hemachate;† and Shaw gives a third in the Coluber Porphyriacus from New Holland.‡

* Hist. Natur. V. II. Discours. p. 67, 88. † P. 115. ‡ Zool. V. III. p. 423.

No. XXII.

COLUBER.

Scuta Abdominalia 151
Squamæ Subcaudales 46 } 197

Called by the natives

The *head* big, thicker than the neck, ovate, slightly depressed, the rostrum compressed on the sides, and the point turning up. Between the nose and shield-form lamina, small, smooth, orbicular scales surround a pair of round laminæ; of the three between the eyes the middle lamina is narrow, lance-shape; the lateral broad and convex; the semicordate pair short: the occiput covered with smooth orbicular scales, smaller than those in front.

The ringent aperture between the nostril and the eye is also found here, in the same situation as in the two preceding subjects.

The *mouth* rather large. There are fangs on each side, of a size proportionably large: no marginal teeth above, and the palatal teeth in the under jaw small. The *eyes* oval, large. The *nostrils*, near the point of the reverted rostrum, very small.

The *trunk*. The neck slender; the body towards the middle rather thick; the back carinated, the sides swelling to the abdomen, which is convex, not flat as in the last. The *tail* terminates in a small horny point. The *scales* on the back carinated, but smooth on other parts.

The *length* one foot two inches and a half, including the tail of two inches and a half.

The *colour*. The upper part of the head dark brown, with a cineritious streak from each orbit. The trunk of a lighter brown than the head, with cinerious and brown oval spots on the back and sides. The belly yellowish, freckled with minute dots. On each side of the fore part of the trunk, there is a row of small darkish spots next the scuta.

OBSERVATIONS.

This serpent was received from India in 1802 without country name, or the place where it was found being specified.

It has more of the viper appearance than the last. The dorsal scales are carinated, and the laminæ on the head less regular than usual: yet, except on the rostrum, they are more completely formed than commonly found in venomous serpents.

" Quelques serpens venimeux (says Cepede) ont quelquefois entre les yeux trois " écailles un peu plus grandes que celles du dos."* This peculiarity, however, does not apply to the laminæ in the present subject.

In the observations on the Bodroo Pam (No. XX.), reference was made to a paper lately published in the Philosophical Transactions, " on the Orifices found in certain " venomous Snakes situated between the nostril and the eye:" of which the three subjects immediately preceding afford examples.

Similar orifices in the rattle snake had long since been described, and were suspected of being the external organs of hearing;+ but were regarded as peculiar to the Crotalus, and had not been found, so far as I know, in any of the other serpent tribe, till discovered in the yellow snake of Martinico.

On a cursory inspection of several collections in London, these orifices were found in three of the genus Boa; and in eleven of the genus Coluber; exclusively of the Martinico snake, the Bodroo Pam, the two subjects last described, and two others lately received from the West Indies. In all, three Boæ, and fifteen or sixteen Colubri.

Hitherto the orifices have only been found in venomous serpents; but in none of the genus Anguis.

It being intended, in a subsequent fasciculus, to give the figures explanatory of Mr. Home's anatomical investigation, it will be sufficient to remark here, his having clearly ascertained that the orifice near the eye in these venomous serpents, has no connexion whatever with the auditory organ.

No. XXIII.

COLUBER.

Scuta Abdominalia	210	303
Squamæ Subcaudales	93	

Called by the natives

The *head* small, short-ovate, obtuse, covered with nine laminæ. The first pair between the nostrils, rounded in front; the next pair square and larger; the middle lamina between the eyes heart-shape, the lateral semilunate; the semicordate pair long and obtuse.

The *mouth* large; the teeth small; no fangs. The *eyes* large and globular. The *nostrils* wide.

* Hist. Nat. V. II. Discours. p. 67. + Phil. Transact. Vol. XIII. p. 26.

The *trunk*. The neck roundish, smaller than the head. The body much compressed, and more slender near the vent than near the head. The *tail* tapers rapidly to a long, small, horny point. The *scales* ovate, and smooth.

The *length* two feet three inches, of which five inches belong to the tail.

The *colour*. The head cineritious, with an oblique black fillet from each orbit; and a bifid blotch of the same colour on the crown: the cheeks streaked with black. The trunk nearly of the colour of the head, with a row of distinct dark brown spots, round or oval, on each side of the ridge of the back: on the tail, the spots run into each other. The scuta are marked on their anterior edges, with four, or three, obsolete dusky points.

OBSERVATIONS.

The specimen was received from Java, without country name, or description. Of four different specimens examined, the variation in the number of scuta and squamæ was very inconsiderable: the colour and maculæ were alike in all.

The present subject, in the compressed form of the trunk, in the colour and disposition of the dorsal spots, bears a strong resemblance to the serpent last described.

No. XXIV.

COLUBER.

Scuta Abdominalia 209
Squamæ Subcaudales 160 } 369

Serpens viridis ore acuminato Aspidis species. Seba Thes. V. ii. Tab. 57. fig. 4.

Col. Nasutus. Shaw Zool. V. iii. Part ii. p. 548.

Called by the natives

The *head* long, wedge-form; the rostrum narrow, compressed, sharp, but not turned up at the point as in the Coluber Mycterizans. The usual front lamina (which in other serpents covers the point of the nose) extends internally on the mouth, and projects externally a very little beyond the first pair of laminæ. In the Coluber Mycterizans, the front lamina though somewhat reverted interiorly, is elongated externally into a slender blunt point which turns upwards and backwards: in other respects there is a strong similitude. The first pair of laminæ separating the nostrils, pyramidal, cut obliquely at the base; the next pair oblong, large, rounded behind; the central lamina

of the three between the eyes, funnel-shape; the lateral, projecting over the eyes, broad, pyramidal; the semi-cordate regularly formed.

The *mouth* rather wide; there are no fangs; but a complete marginal row of teeth above. The *eyes* oval, large, lateral, placed in grooves, which extend to the nostrils. The *nostrils* very small, and distant from each other.

The *trunk*, thicker in all its proportions than that of the Coluber Mycterizans, but *tail* long, slender, and taper to a sharp point. The *scales* smooth, linear or oblong on the upper part of the trunk, though rather tending more to oval than in the Coluber Mycterizans, or the Bolla Passerchi formerly described.*

The *length*, four feet eleven inches, of which the tail measures one foot eight.

The *colour* green as in the Coluber Mycterizans, and a yellow thread runs also along each side of the scuta, and subcaudal squamæ, from the throat to the end of the tail.

OBSERVATIONS.

This subject was received from Java, and I had no doubt of its being the green serpent found in Seba, to which I have referred.

Its similitude to the Coluber Mycterizans is striking at first sight; but besides its general habitude, the straight pointed rostrum sufficiently distinguishes it.

No. XXV.

COLUBER.

Scuta Abdominalia 186.
Squamæ Subcaudales 153.
Called by the natives, *Mancas* in Guzerat.
Rooka in Mahratta.

The *head* somewhat broader than the neck, oblong, flattened on the crown, and also on the sides from the eyes to the obtuse or rounded rostrum. Two square laminæ divide the nostrils; the next pair larger, of the same shape; the middle lamina between the eyes funnel-shaped; those on the side large; the semicordate pair regularly shaped, with some large scales on each side of the point.

The *mouth* large. Two rows of teeth above; no fangs. The *eyes* oval and remarkably large. The *nostrils* rather large.

The *trunk* cylindrical, elegantly shaped. A remarkable series of oblong-round scales on the ridge of the back, and a row of pentagonal scales on each side of the scuta; the

* Coromandel Serpents, No. XIII.

other scales linear disposed in oblique rows. The *tail* tapers to a slender point, and is covered with scales nearly orbicular.

The *length* three feet five inches, of which one foot two belongs to the tail.

The *gull*, when biggest, one inch and a half.

The *colour* of the upper part of the head and trunk dark blue; the neck, abdomen, and tail, a bluish white. The colour in the recent subject is probably more green.

OBSERVATIONS.

The laminæ of the head in this serpent, as well as the disposition of the linear scales on the trunk, resemble those of the Coluber Mycterizans, or Passerchi Pam.

The specimen was received from Bombay, sent with several others by Dr. Scott.

It was declared very venomous by our snake-catcher, who said he had known two men killed by it. By another its bite was said to occasion immediate giddiness, and to prove mortal in two days.

It is represented as living on trees; and not uncommon.

No. XXVI.

COLUBER.

Scuta Abdominalia 176.
Squamæ Subcaudales 127.
Called by the natives *Cumberi muken.*

The *head* hardly thicker than the neck, oblong, obtuse. The front pair of laminæ nearly square, rounded only a little on the posterior edge; the next pair of the same shape, but larger in size; the middle laminæ of the next three behind, funnel-shaped; the lateral, broad, conical; the semicordate pair well shaped, with two little specks, or dots in the middle.

The *mouth* large. No fangs. A full row of teeth above, and in the under jaw the teeth are numerous and close.

The *eyes* large, and globular. The *nostrils* large, and situated on the edge of the rostrum.

The *trunk* rather slender in proportion to its length, but cylindrical and well-shaped. The *tail* attenuates gradually to a sharp point. The *scales* on the neck near the head are orbicular; but from that to the vent they are oblong, or linear; except a row of large hexagonal scales on the ridge of the back, and a similar series on each side of the scuta. The linear scales are not continued on the tail, but give place to hexagonal.

The *length* three feet eight, of which the tail measures one foot one inch and a half.

OBSERVATIONS.

The specimen was received from Mr. John of Tranquebar, who represents the serpent as extremely beautiful when alive.

It certainly has no poisonous apparatus, though said by the natives to be highly noxious. They account for its name (implying *top-climber*) in the following manner: that after the death of the person bitten, it ascends a tree near the funeral pile, looking down, as if with malicious pleasure, while the corpse is consuming.

This serpent is described by Schneider.* He mentions two specimens in Block's Museum. In one, Scuta 198, Squamæ 158; in the other, Scuta 144, Squamæ 65

In two drawings received from Mr. John the Scuta are 190, Squamæ 150.

The difference in the subcaudal squamæ in Schneider's description, may possibly be owing to the tail having been mutilated, a common accident, where it is so slender near the point, as in the Coluber Mycterizans and others; the difference in the scuta, supposing no error in counting, is greater than I ever met with in the same species, being no less than 65.

He describes the scales as carinated, which I found smooth.

No. XXVII.

ANGUIS.

Squamæ Abdominales 206
Squamæ Subcaudales 8.
Anguis Scytale Lin. Sys. Nat. p. 923. Called by the natives

The *head*, small, short, a little more depressed and obtuse than the tail, to which it bears a resemblance sufficient to entitle it to the denomination of double-headed snake. The front trigonal lamina intersects two of the same shape, which are perforated by the nostrils; the next pair large irregularly square; behind, five trigonal laminæ occupy the place of the shield-form, lateral, and semicordate.

The *mouth* wide, the lower jaw shorter than the upper. A marginal row of teeth above; no fangs. The *eyes* globular, very small. The *nostrils* small also.

The *trunk* cylindrical, swells a little to the middle, and afterwards diminishes very gradually, so that the short tail is nearly as big as the head but less obtuse. The *scales* orbicular, polished, and ciliated; contiguous in some places, in others imbricate, and

* Hist. Amph. Java, II. p. 299.

so disposed as to appear polygonal. A series consisting of about 206 may be counted on the middle of the abdomen, hardly, if any thing, larger than the dorsal scales; but the subcaudal squamæ are very different, and might be termed scuta. The *tail* is very short, thick, cordate.

The *length*, one foot eight inches, of which the tail claims only half an inch. The circumferences of the neck one inch and a half; middle of the trunk two inches; near the vent one inch seven lines.

The *colour* of the head and back bluish black; two yellowish spots on the nose, and two or three incomplete rings of the same colour on the occiput and neck. The belly of the same colour with the back and sides, but crossed by more than 30 broad, yellowish rings with ragged edges, some complete, but most of them imperfect; the under part of the tail yellow tipped with black, and a black dot on each side of the vent.

OBSERVATIONS.

This anguis was received from Java, without description, or local name.

Though it agrees in several circumstances with the Anguis Scytale of Linneus, it differs materially in the number of squamæ. The dilatation of the subcaudal squamæ resembling scuta is not marked in any of the descriptions or figures of the Scytale which have fallen in my way.

No. XXVIII.

ANGUIS.

Squamæ Abdominales 207.
Squamæ Subcaudales 6.
Called by the natives *Shilay Pamboo.*

The *head* of this serpent thicker and more depressed than the very short thick tail, which, with a black dot on each side resembling eyes, might at first sight be mistaken for the head. The anterior pair of laminæ are trigonal, and perforated near the base by the nostrils; the second pair large, oblong; between the eyes are three trigonal laminæ, indented; behind which there is a cluster of smaller angular laminæ.

The *mouth* proportionably large. A marginal row of teeth above; no fangs. The *eyes* orbicular, very small. The *nostrils* on the edge of the rostrum.

The *trunk* cylindrical, not much thicker than a swan's quill, and nearly of equal

thickness throughout. The *tail* short, ovate, smaller than the head, and ends in a blunt point. The *scales* on the occiput and upper part of the neck, round and contiguous; on other parts more ovate and imbricate. They are all smooth, and look as if varnished; there is no abdominal row distinguished by their size; but the subcaudal squamæ resemble scutella.

The *length* nine inches, two lines; the latter claimed by the tail.

The *colour* on the crown and back dark chesnut; there is a narrow, cross, yellowish fillet on the occiput, and two of the same colour on the neck; along the rest of the trunk may be counted about twenty-eight pair of similar fillets, these points alternating, not joining; the abdomen of a lighter chesnut, with above thirty cross bands of paler brown with ragged margins; the under part of the tail lighter than the abdomen, and on each side of the vent there is a black dot.

OBSERVATIONS.

Two specimens of this serpent were received from Tranquebar, where its bite is said to produce great weakness, and such a wasting of flesh, that the skin hangs loose, and may be handled like a piece of white cloth. The absence of poisonous organs stands against this fiction.

No. XXIX.

ANGUIS.

Squamæ Abdominales 194.
Squamæ Subcaudales 6.
Anguis Maculata; Lin. Sys. Nat. 391. Called by the natives

The *head* not thicker than the neck, short; the front slightly declivous, the rostrum obtuse. The front pair of laminæ triangular, and perforated by the nostrils; the next pair large, sub-orbicular; the three between the eyes ovate, the middle one smallest; in the place of the semicordate laminæ there are two ovate, and scales of the same shape cover the occiput.

The *mouth* rather wide, the marginal row of teeth complete: no fangs. The *eyes* orbicular, distant, small. The *nostrils* small.

The *trunk* is sub-cylindrical, and nearly of equal thickness, or swells very inconsiderably; the circumference within an inch of the vent rather exceeds that of the neck, and the short tail differs less from the head in size than in shape.

The *scales* near the head contiguous; on other parts imbricated: but all sub-orbicular, smooth, ciliated, splendent, and differ little in size. The subcaudal scutella, as in the two former subjects, are found here also, though in one specimen less expanded.

The *length* ten inches, of which half an inch belongs to the tail.

The *colour*. The head blackish, with two yellowish devaricating streaks from the crown, and two roundish spots of the same colour on the neck. The trunk above presents thirty-six pair of reddish-brown sub-orbicular spots of various sizes, with black margins of various breadths, an undulating black thread that runs along the ridge of the back serving as part of the margin to each pair. The yellowish-white abdomen is crossed by twenty-eight bands, broader, but of the same colour as the margins above, with which they are united; in some places the belly appears tesselated black and white.

OBSERVATIONS.

This anguis was received from India without the country name, or mention from whence sent.

There can be no doubt of this being the Anguis Maculata of Linnæus, but it is remarkable that the difference in subcaudal squamæ as given by Gronovius (no less than five) should not have been noticed by Linnæus, who cites Gronovius; and that the dilatation of the subcaudal squamæ, as a deviation from the generic character, should have passed unnoticed by Linnæus in his own description.*

It should however be remarked that of two specimens, the expansion of squamæ in one was less perceptible than in the other from which the drawing was made.

No. XXX.

COLUBER.

Scuta Abdominalia 220
Squamæ Subcaudales 61 } 281.

Called by the natives *Chunalee.*

The *head* broader than the neck, long oval, depressed above; the rostrum compressed, obtuse. Between the nostrils are interposed two pentagonal laminæ; the next pair larger, sub-triangular; behind which appear an unusual row of small laminæ; the shield-form laminæ exactly shaped, those on each side convex, sub-lunated; the semi-

* Mus. Ad. Ic. p. 31.

cordate pair truncate, obscurely divided, and marked with four darkish dots; the hind head covered with smooth orbicular scales.

The *mouth* large; the under jaw considerably shorter than the upper. The *teeth* remarkably small; a marginal row above, and no fangs. The *eyes* large, sub-orbicular. The *nostrils* small.

The *trunk*. The *neck*, at first smaller than the head, swells into the trunk, which is well and proportionally formed: the *tail* round, remarkably short, terminates in a slender point. The scales oval, smooth, and every where very small in size; and the usual row of larger scales bordering the scuta is wanting. The scuta remarkably wide.

The *length*, three feet four inches, of which the tail measures seven inches four lines.

The *colour* above cineritious, with large darkish ragged spots along the ridge of the back, while others smaller and more faint are scattered on the sides. The abdomen and under part of the tail uniformly white without spots.

OBSERVATIONS.

Two specimens in good preservation were received from Dr. Scott, of Bombay, sent to him from Buchier, by Mr. Bruce. The serpent, it seems, is found also in the Mahratta country.

The natives pretend that its bite is in a short while followed by blotches on the skin, and proves mortal in a fortnight, or within the month.

The serpent, however, has no venomous organs.

The smaller of the two specimens is here described. The only difference found was in the abdominal scuta, the number of which in the largest was 238.

In the lesser, 220.

18.

No. XXXI.

BOA.

Scuta Abdominalia 204.

Scuta Subcaudalia 44.

Called by the natives *Seu Walalay*.

The *head* obtuse ovate, a little thicker than the neck, the crown flat, the rostrum rounded at the point, but flattish on the sides. The first pair of laminæ between the nostrils very small, sub-orbicular; the next pair thrice as large, oblong-square, anteriorly

rounded; the shield-form lamina broad, and short, the lateral remarkably slender; the semi-cordate pair large, with several small laminæ on the sides.

The *mouth* moderate in size; the teeth very slender; the palatal teeth complete, but no marginal row, the fang on each side extremely small. The *eyes* on the side, distant, globular, small. The *nostrils* small, on the verge of the rostrum, distant from each other.

The *trunk* cylindrical, swelling very moderately, from two inches behind the head to within four inches of the vent; it then tapers to the tail, which is short, with a small point, but not sharp. The *scales* small, close, imbricate, ovate, but on the ridge of the back to the end of the tail there is a series of somewhat larger, orbicular, or rather hexangular scales; all are smooth, and splendent.

The *length* two feet three inches, of which the tail measures four inches two lines.

The *colour* of the head and about one third of the upper part of the trunk a pale yellowish brown; the rest a reddish brown, variegated with rings composed of pale or whitish short lines, rather than dots, intermixed with the brown scales. The abdomen white, with a yellowish cast, without spots.

OBSERVATIONS.

The present subject was received from Mr. John, of Tranquebar, and is clearly a variety of the Gedi Paragoodoo, No. I. of the Coromandel Collection, which by the Tamuls is named Karu Walalay. The present is distinguished on account of its colour, and called Brown Walalay. I never met with it in the Circars, nor with a Gedi Paragoodoo without rings, which Mr. John once saw.

On the subject of the Gedi Paragoodoo, it may be proper to remark here that I have two specimens from Bombay of a size much larger than I met with in the Circars.

The largest,	Scuta Abdom. 220.	Length	3 feet	11 inches.
	Scuta Subcaud. 50.	Tail - -		5 inches 2 lines.
		Circumference -		3 inches and half.
The smallest,	Scuta Abdom. 221.	Length	3 feet	7 inches.
	Scuta Subcaud. 52.	Tail - -		5 inches 5 lines.

Both specimens, except the number of abdominal scuta, agreed exactly with the description formerly given of the Gedi Paragoodoo.

No. XXXII.

COLUBER.

Scuta Abdominalia 170.
Squamæ Subcaudales 54.
Serpens Ceilonica Bitin dicta, Seba, II. t. 94.
Ulpera, Gron. Amph. No. XLII. p. 63.
Coluber Lachesis, Shaw Zool. III. p. 2, 402.
Called by the natives

The *head* somewhat broader than the neck, thick, oblong, contracted at the rostrum; the crown flattish, and covered with small, ovate, imbricate, and carinated scales. A large, triangular, convex, lamina fronts the compressed rostrum, on each side of which, two smaller edge the nostril. Between the nostrils there is a remarkable rose-fashion cluster of small, smooth, orbicular, contiguous scales or laminæ. The upper edge of the orbit is covered by an oblong thin lamina, as one more lineal does that of the nostril. All the rest of the scales on the head are carinated, except a few on the cheeks smooth, and orbicular.

The *mouth* large; the teeth in the under jaw, as well as the palatal rows above, remarkably slender; and the fangs, on each side in the usual situation, were proportionally not large.

The *eyes* oval, rather small. The *nostrils* on the side of the compressed rostrum, large, ringent, and near each other.

The *trunk* roundish, thick, and clumsy. The *tail* short, round, tapering to a horny point, which is covered above with scales. The *scales* long ovate, and highly carinated, except a row on each side of the abdomen, smooth and orbicular. They are all strongly adherent on the anterior part, but towards the point loose and detached, as if capable of ruffling on erection. The scuta remarkably broad.

The *length* four feet six inches, of which the tail measures seven inches 3 lines.

The *colour* a light brown, with large sub-orbicular, chesnut-coloured spots from the neck to the vent. The scuta white, bordered half way down the trunk, by distant, black dusky spots, three-fourths smaller than those on the back.

REMARKS

This subject, killed at Bombay in 1803, was received from Dr. Scott, and supposed to be of the same species by which a boy, belonging to Mr. Leachman, had been mortally wounded a few years before. From its venemous apparatus no doubt can be entertained of its atrociousness, and indeed all external appearances condemn it.

I have referred to the figure in Seba, Tab. 94, as approaching nearest to the present subject. It differs however in the shape of the rostrum, and still more in representing fangs in the under jaw: an anomaly of which there is no other instance, so far as I know.

That Seba ascribes fangs to both jaws can admit of no doubt. "Ori tam supra, quam infra, haud plures quatuor insident dentes, longi, incurvi, acuti, quos emittere rursus rursusque recondere valet animal." Vol. II. p. 99.

The Serpens Corallina Amboinensis of Seba, Pl. 30, has no fangs in the under jaw, and in the shape and lamina of the rostrum, comes nearer my specimen than either of the figures, Pl. 93 and 94.

What Seba depicts as testiculos, Tab. 93, is the double penis, and in my specimen is much more conspicuous; so that his Bitin, Pl. 94, is not a female.

A good description of the Bitin, as far as a dried specimen admitted, has been given by Gronovius (Amph. Zool. Hist. Pl. 68, No. XLI.); but though he refers, under doubt, to the figures in Seba, it is plain from the shape and shortness of the tail, that his Bitin belonged to neither of the two, but rather to the Serpens Corallina Amboinensis of Seba, Tab. 30. The abdominal scuta in his specimen were 141, the caudal squamæ 24.

Much has been written concerning this serpent; authors in succession copying from one another. Fernandes (Hist. Rept. Tract. III. p. 70, Rome 15.) represents it of enormous bulk, in the Island of Cuba, with fangs of the length of a finger

No. XXXIII.

COLUBER.

JAVA.

Scutæ 168.
Squamæ 84.

The *head* ovate; obtuse, a little broader than the neck, depressed, covered chiefly with small orbicular smooth scales behind, the laminæ extending only to the crown. The first pair of laminæ large, round, and perforated by the nostrils. Behind these are two triangular, and one diamond shape: all these are black. The next pair roundish. The semicordate very short.

The *mouth* proportional; a complete marginal row (of teeth) above. No fangs. The *eyes* small. The *nostrils* vertical, very minute.

The *trunk* cylindrical, and covered with very small, oval, close (slightly carinated) scales. The *tail* short, tapering to a small obtuse point. The row of scales next the scutæ are not larger than the others. The middle lamina between the eyes, narrow, lance shape; the lateral (ones) broad.

The *length* one foot one inch, of which the *tail* measures three inches.

The *colour* black (or very dark brown), with cross bands of dusky yellow, at equal distances, half surrounding the trunk, from the neck to the end of the tail: a remarkable cowl of the same dusky yellow on the hind head. The scutæ are of a lighter yellow, with a row of distant black spots on each side. The under part of the tail speckled with black.

No. XXXIV.

COLUBER.

JAVA

Scutæ 140.
Squamæ 42.

The *head* hardly thicker than the neck, oblong, ovate. The first pair of laminæ trigonal; and the second, irregularly square, rounded. The shield-form lamina sharp-pointed; the lateral lamina conical, the semi-cordate pair truncate.

The *mouth* small; no fangs; a marginal row of teeth above. The *eyes* not large, orbicular.

The *nostrils* minute, but open.

The *trunk*. The neck and body cylindrical; the latter swelling a little about the middle, tapers towards the tail, which is thick and short, ending in a sharp point.

The *length*, one foot one inch and three lines, of which the tail measures two inches and seven lines.

The *colour* dark chesnut, intermixed on the upper part of the body, with waving whitish dotted lines, forming imperfect squares. The *cheeks* and *rostrum* light, and there is a collar of yellowish white round the neck. Along the centre of the back there are twelve larger white irregular-shaped dots, each surrounded by a black margin. The scutæ yellow: one half of every third or fourth scuta chequered with black.

No. XXXV.

COLUBER.

JAVA.

Scutæ 144.
Squamæ 33; *tail broken*.

The *head* oblong, ovate, a little broader than the neck. The first pair of laminæ trigonal, the second pair larger, and roundish. The shield-form lamina completely regular, the lateral, narrow; the semicordate pair large, with a white speck on each.

The *mouth* rather large, without fangs. The *eyes* large, orbicular. The *nostrils* small, vertical.

The *trunk*. The body swells and tapers inconsiderably; the *tail* round, thick, taper, but had been broken. The *scales* oval, and some rows on the back very slightly carinated.

The *length*, one foot four inches three lines. The broken tail measured three inches two lines.

The *colour*. The head black, or very dark brown. The cheeks streaked with black. The trunk striped. Along the ridge of the back, to the end of the tail, runs a black thread, on each side of which are two parallel broad fillets; the one, a mixed cinereous brown, the other black. The scutæ white, edged with brownish black, giving the appearance of so many cross bands; but on the tail the bands are divided in the middle.

No. XXXVI.

COLUBER NAJA.

JAVA, XVII.

Scutæ 186.
Squamæ 64.

This specimen is of nearly the same size with a specimen received from Tranquebar, *Scutæ* 180, *Squamæ* 57, but the principal difference is in the colour and circular bands on the trunk, which I never observed in young subjects on the Coast.

The *length* of this specimen is one foot two inches two lines.

No. XXXVII.

COLUBER.

JAVA, XIII.

Scutæ 194.
Squamæ 66.

The *head* ovate, flat, thin. Two roundish laminæ between the nostrils; the next pair nearly square; the shield lamina bell-form; the semi-cordate pair obtuse.

The *mouth* of moderate size; no fangs. A marginal row of teeth above. The *eyes* very small, globular. The *nostrils* minute.

The *trunk* round; swells and tapers proportionally; a little compressed about the middle. The *tail* short, with a round point. The *scales* ovate, smooth.

The *length*, one foot seven inches. The *tail*, three inches and three quarters.

The *colour*, dark brown, freckled with dusky, yellow, short, waving threads, which form irregularly oval spots along the back. The *belly*, white.

No. XXXVIII.

COLUBER.

JAVA, XIV.

Scutæ 170.
Squamæ 52.

The *head* obtuse, ovate, scarcely broader than the neck; *rostrum* rounded. On the point of the front laminæ a trigonal pair separates the nostrils; behind these a narrow pair. The shield-form lamina very broad, acuminated; the semi-cordate, well shaped.

The *mouth* without fangs. The *eyes* spherical. The *nostrils* lateral, very small.

The *trunk* is of the thickness of a small goose-quill, tapers to a sharp point at the tail. The *scales* smooth.

The *length*, seven inches three lines, of which the tail measures one inch two lines.

The *colour*. A black double fillet crosses the orbits, and there is an oblique streak of the same colour on each cheek. From the middle of the shield-form lamina rises a black fillet, which, dividing into two, is continued on each side of the ridge of the back to the tip of the tail: two narrower stripes of the like colour run parallel to these as far as the anus. These fillets are edged with very fine white lines. There are two other smaller waving lines on each side, which extend the whole length of the body. The colour between these stripes is a light bay, so that the body appears black and bay alternately. The *belly*, dusky white.

No. XXXIX.

COLUBER.

INDIA, I.

Scutæ 202.
Squamæ 68.

The *head*, oblong, ovate, flat, considerably broader than the neck. The first pair of laminæ rounded; the second pair much larger. The shield-form lanceolate; the semi-cordate pair small, but well shaped.

The *mouth* large, without fangs; a marginal row of teeth above.

The *eyes* small, orbicular. The *nostrils* small.

The *trunk*. The body is small for its length, gradually enlarges till beyond the middle; it then as gradually decreases towards the anus, where it suddenly becomes less, and terminates in a small sharp pointed tail. The *scales* are every where very obtuse.

The *length*, one foot eight inches, of which the tail measures three inches and a half.

The *colour*. The head dark brown, the cheeks striped with the same colour; the back is of a lighter brown, having a dull greenish tint, which grows fainter at the sides, and is lost as it approaches the scutæ. The *belly* is white.

No. XL.

COLUBER.

INDIA, II.

Scutæ 151.
Squamæ 46.

The *head* small, rostrum obtuse. The first pair of laminæ small, and nearly orbicular, and are perforated by the *nostrils*. The second pair very small, triangular. A third pair a little larger, ovate. These terminate at the orbits of the *eyes*: the remainder of the *head* is covered by very small orbicular scales, which towards the occiput become carinated. The *mouth* small, no fangs, a marginal row of very small *teeth* above. The *nostrils* small. The *eyes* small, ovate.

The *trunk*. The body thick round, and tapers very gradually into the *tail*. The *scales* are long oval, and carinate throughout.

The *tail* is short, and terminates abruptly, appearing as though a small part had been lost by accident during life.

The *length*, one foot eight inches, of which the imperfect tail three inches, two lines.

The *colour*. The upper part of the head, back, and tail, are of an uniform bluish black colour. The sides are uniformly marked from the chin to the extremity of the tail, with rounded spots of the same colour as the back. These spots regularly alternate with each other, and are connected to one another by slips, from a smaller row of irregular shaped spots along the middle of the belly. The *belly*, white.

No. XLI.

COLUBER.

JAVA, XVI.

Scutæ 217. 218.
Squamæ 76. 78.

The *head* broader than the neck, the occiput swelling out. The rostrum obtuse. The lamina between the nostrils small, square; the next pair of the same shape, remarkably large; the three between the eyes remarkably small; the central one resembles the point of a lancet, the lateral, pyramidal, short. The semi-cordate pair long, with several large scales on each side.

The *mouth* proportionally narrow; the *teeth* very small, a marginal row above; no fangs. The *eyes* globular, very small; the *nostrils* large.

The *trunk* cylindrical, swells and lessens moderately; the *tail* tapers more sensibly to a very small not acute point. The *abdomen* flattish; the *scales* remarkably small, ovate, smooth, close.

The *length*, three feet one inch and a half; of which the tail measures seven inches.

The *colour*. The head a yellowish bay; the trunk dark brown, deepening towards the tail; six or eight yellowish bands are visible on the back, narrow on the ridge of the back, and expanding towards the scutæ; they are bright on the neck, but evanescent about the middle of the trunk. The scutæ, and other parts beneath, are of nearly the same colour with the bands; but both may probably have been altered by the spirit.

No. XLII.

COLUBER.

JAVA, XVI.

Scutæ 238.
Squamæ 95.

The *head* very little larger than the neck. The front lamina trigonal; the first pair pentagonal; the second nearly of the same form, but much larger. The shield-form

lamina regular; the lateral ones sub-conical, the semicordate pair broad, obtuse, having a large lamina on each side near their apex.

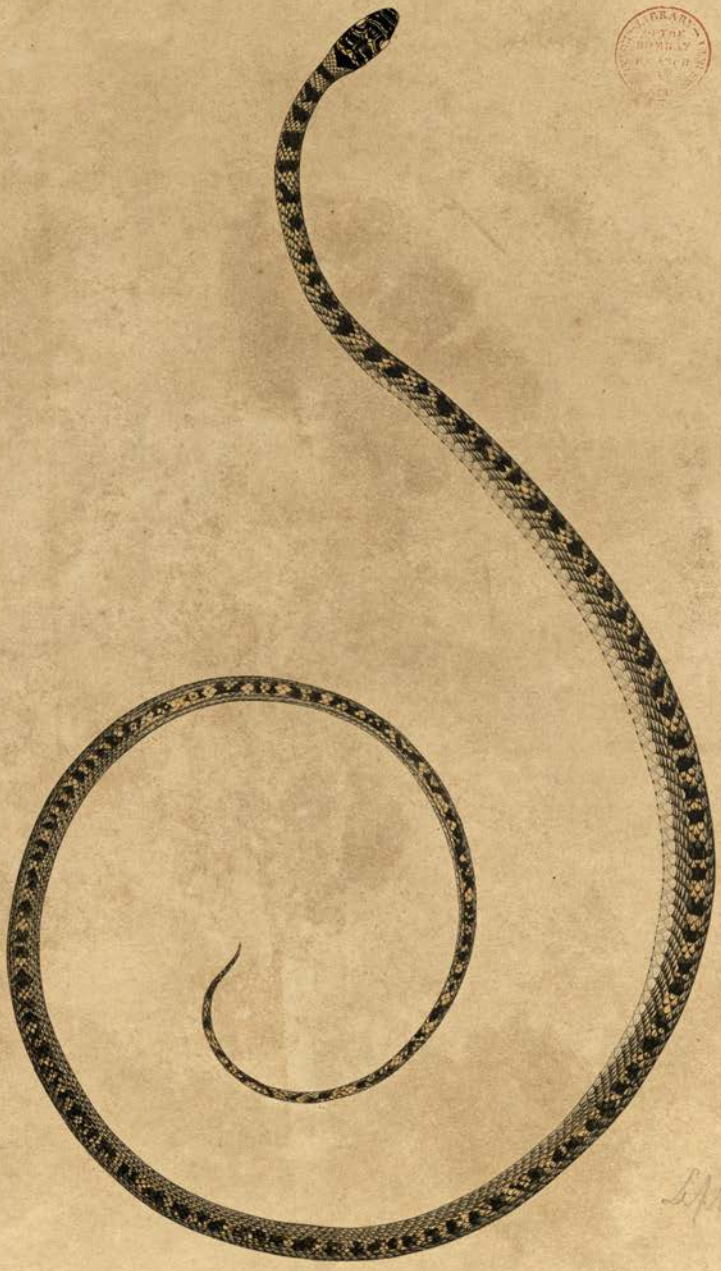
The *mouth* proportionally large; a marginal row of teeth above; no fangs. The *eyes* large; globular. The *nostrils* close to the rostrum, rounded, open.

The *trunk* depressed; scales ovate, smooth. The *tail* round, gradually tapering to an obtuse point.

The *length*, three feet eight inches and a half, of which the tail measures nine inches.

The *colour*, a bright bay, inclining to yellow. A black line passes up the cheek to the eye, and from thence back and downwards to the angle of the mouth. Another line runs from the eye, along the margin of the semicordate pair of laminæ, and terminates in a transverse band of black at the occiput. From thence begin fillets, which gradually become wider and blacker, and afterwards diminish in strength, become broken, and finally disappear about half way towards the tail. These fillets have a white dot, or break at every inch distance. On each side, at a small distance from the former, is a much smaller dark line, which is more broken, becomes fainter, and is lost at the same part of the body with the other fillets. The remainder of the body and tail is of a uniform light bay colour, which becomes weaker at the sides. The *belly* is white.

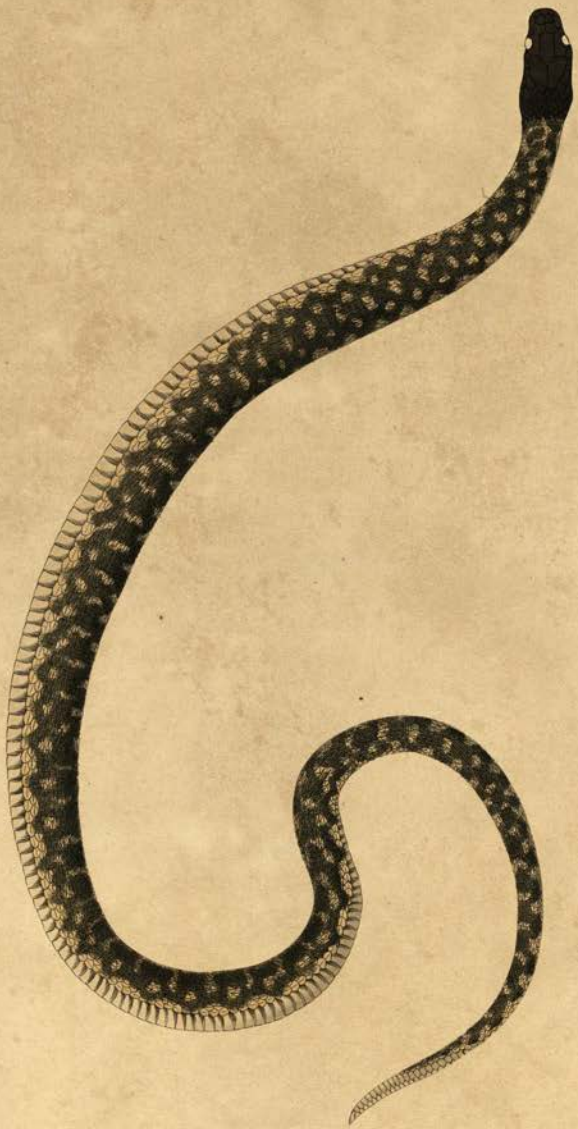
Coluber



Kalla Jin.

Dooblee.

Chittee.



Dora.

Kerril pattee.

Hydrus granulosa
Hydrophis Obscura

Shootur sun.

Kalla Shootur sun.

Chittul.

Hoogli pattee.

Hydrus Schistosus.
Same as former

Valakadyen

Hydrus
Hydrophis Spiralis.

Shiddil

Ourdia.

A

B

Ourdia A

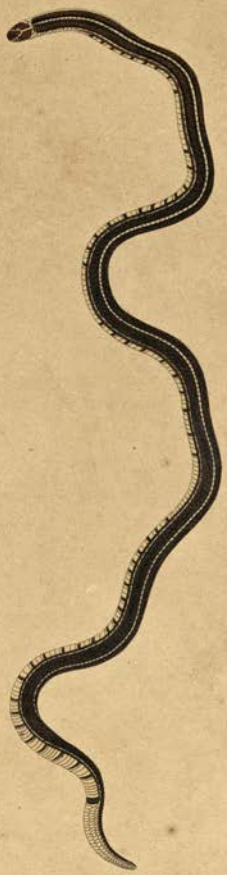
Ourdia B

Erutalgy Nagam

Manedulli Pamboo

Sarey Pamboo

BOMBAY BRANCH



Callophis
macclandii.
?

Bodroo Pam.

Trigonocephalus

Boiga multicarinata.

Trigonocephalus hypnale

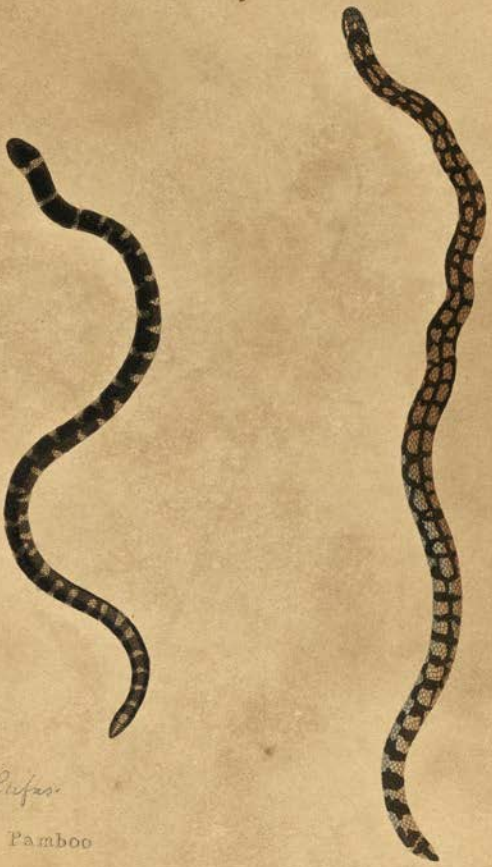
Malabar

Bitis arietans
Multimaculata
Burma.

Boyenval Jeudw

Maniar

Comberi Mokeen



C. Rufus.

Shilay Pamboo

Cylindrophis maculatus —

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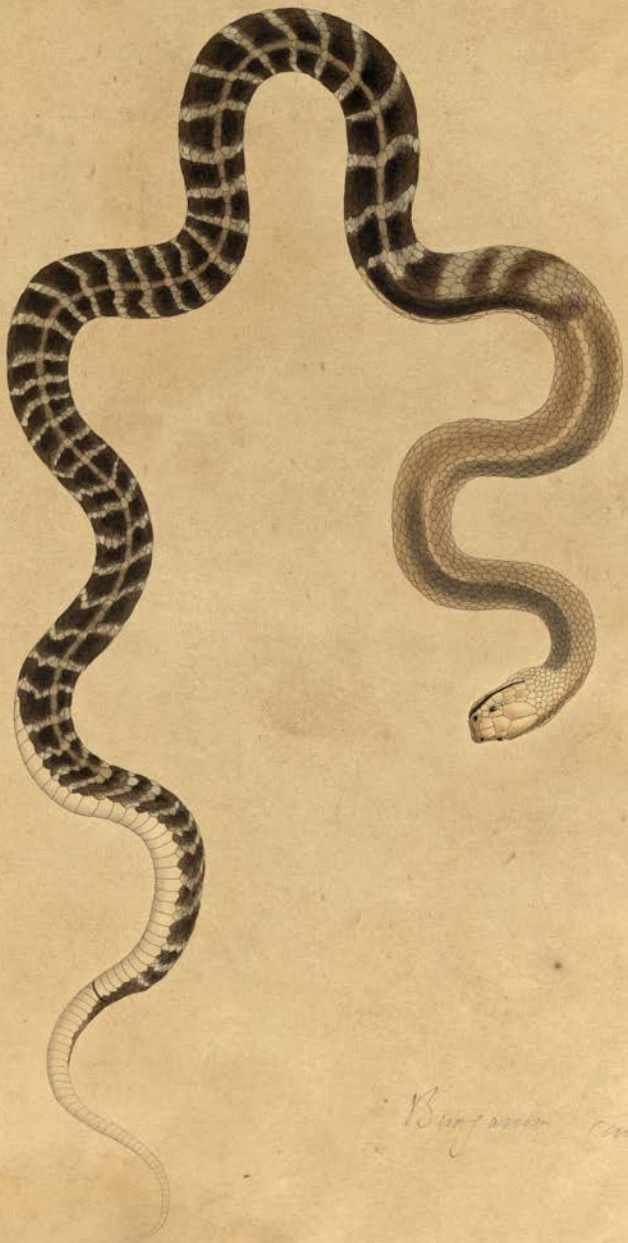
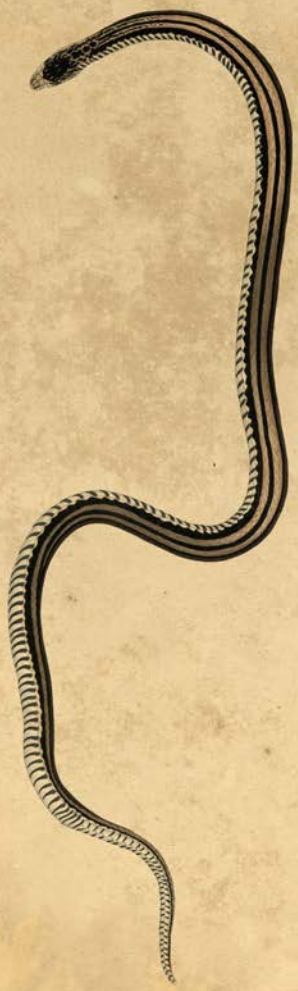
Coluber



Sevwalaley



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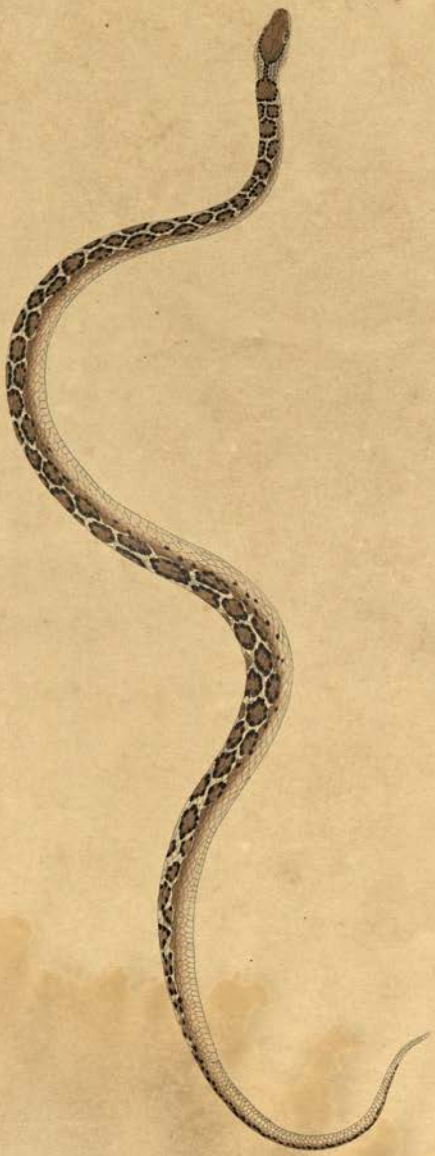
BOMBAY
BRANCH
OF THE
R.A.S.

Coluber Naja



Lycodon?

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Cerberus Rhy
Gro

Fasciatus

APPENDIX.

No. I.

Remarks on the Voluntary Expansion of the Skin of the Neck in the Cobra de Capello, *or Hooded Snake of the East Indies. By* PATRICK RUSSELL, *M. D. F. R. S. With a Description of the Structure of the Parts which perform that Office. By* EVERARD HOME, *Esq. F. R. S.*

Read before the ROYAL SOCIETY, June 14th, 1804.

THE remarkable expansion of the skin of the neck in the Coluber Naja of LINNÆUS, or Cobra de Capello of the East Indies, and which constitutes a principal character of the species, is produced by an apparatus, hitherto, as I believe, very imperfectly described. It is a voluntary action, totally distinct from that inflation which all serpents when irritated are more or less capable of, and which the Coluber Naja also assumes at the same time that it expands its hood.

In botanical excursions in India, fragments of serpentine skeletons, made by the black ants, were occasionally met with; but in such as were supposed to belong to the Coluber Naja, the peculiar disposition and structure of the cervical ribs, so different from that in other serpents, had escaped me.

In other serpents, the ribs from the first vertebra to those of the middle of the trunk gradually increase in length; thence they gradually shorten or decline to near the end of the tail, where they disappear or are transformed into short eminences; but in the Coluber Naja, the cervical ribs gradually lengthen to the tenth or eleventh, after which they successively shorten to the twentieth. The ribs, again increasing in length, are at the middle of the trunk, nearly as long as the middle cervical ribs, and then declining, as usual in other serpents, disappear on the tail.

So obvious a peculiarity in the skeleton of the Cobra de Capello, having escaped my notice in India, and finding myself unable to account for the expansion of its hood, which is commonly, in that country, conceived to be connected with inspiration, I brought with me, on my return to England, several subjects for dissection, in order to have the matter properly ascertained; my friend Mr. HOME readily undertook the task, and the subjoined result of his investigation will, I have no doubt, prove satisfactory.

I have on another occasion asserted as a fact, that the neck of the Cobra de Capello, in a quiescent state, shews no external protuberance whatever;* and it is clearly accounted for in the following description, from the ribs, when depressed, lying upon the spine over one another.

MR. HOME'S DESCRIPTION.

THE mechanism by which the Cobra de Capello, when irritated and ready to seize its prey, expands the skin of the neck, giving it the appearance from which the snake takes its name, consists entirely of muscles, acting upon the ribs and external skin of the animal.

From the rounded form of the hood, the skin has the appearance of being inflated; but the most careful examination did not discover any communication between the trachea or the lungs and the cellular membrane under the skin.

In this snake, the ribs nearest the head, to the number of twenty on each side, have a different shape from the rest; instead of bending equally with the other ribs towards the belly, they go out in a lateral direction, having only a slight curvature, and when depressed, lie upon the side of the spine on one another.

* Continuation of an Account of Indian Serpents, page 3.

The first rib is shorter than the rest, and they become gradually longer to the tenth and eleventh, which are the longest; they afterwards become gradually shorter to the twentieth, which is nearly of the same length as the first; so that the ribs on each side, when extended, form an oval figure, of which the spine is the middle line or long axis.

In the extended state of the ribs, the skin of the back is brought over them, forming the hood; and in their depressed state the hood disappears.

The ribs are raised by four sets of muscles: one set from the spine to the upper edge of each rib; a second set from the ribs above, passing over two ribs to the third rib below; another set have their origin from the rib above, pass over one rib, and are inserted into the second below; and a fourth set pass from rib to rib.

The combined effects of these four sets of muscles, raises and extends the ribs; their direction and appearance is so distinctly seen in the annexed figures, as to make a more particular description in a paper of this kind, unnecessary.

The skin of the back is brought forwards on the neck, by a large set of very long muscles going off from each of the first twenty ribs on each side, a quarter of an inch from their head by a tendinous origin, which soon becomes fleshy; the longest of these muscles is two inches long; they are inserted into the skin; and when the ribs have been first extended, have the power of bringing the skin forwards to a great extent. By these means the hood is formed.

To depress the ribs, and restore the parts to that state in which the neck of the animal does not appear disproportionally protuberant, but of the same size as the rest of the snake, there are three sets of muscles: one set goes from the vertebræ of the neck to the lower edge of each rib; but, to give these muscles a greater length of fibre, they are not inserted into the rib immediately above the vertebræ, but pass upwards and outwards over three ribs, and are inserted into the fourth at the middle part of it. These muscles become antagonists to those which raise the ribs.

The second set arises from the points of the ribs; and each muscle goes to be inserted into the skin nearer the head, counteracting the muscles which bring the skin forwards, and drawing it by their action back again. The third set goes from the root of one scutum to the root of the scutum immediately above it, so as to bring it down upon the other.

The object of the present paper being to explain the mechanism upon which the hood, the peculiar characteristic of this species of snake, depends, it is not meant to enter into the uses for which the hood is intended. It may not however be improper to observe, that the expansion of the ribs answers no good purpose respecting the lungs, since they are not so situated in this animal as to receive any advantage from it; but the gullet, where it passes down along the neck, admits of great expansion; and the extended state of the ribs, at the time the animal is employed in catching its prey, may give to the gullet a facility of being dilated for the reception of the food.

EXPLANATION OF THE FIGURES.

PLATE VII.

Fig. 1. A side view of the head and neck of the Cobra de Capello, drawn from the living animal.

Fig. 2. A back view of the hood.

Fig. 3. A front view of the hood.

PLATE VIII.

Fig. 4. A back view of the neck in its expanded state; the external skin being dissected off, and turned aside to shew the muscles which raise the ribs, and bring the skin forwards towards the head.

This view is intended principally to exhibit the muscles which raise the ribs, and those which, when the ribs are raised, act upon the external skin, and bring it forwards.

AA. The scales on the head of the snake.

BB. The eyes.

CC. The muscles which surround the poison glands.

DD. A portion of the poison glands exposed.

EE. A pair of muscles which rise from the neck, and terminate in the head.

F. One of a pair of muscles which bring the head back.

GG. The skin divided in the middle line of the back dissected from the muscles, and turned on each side.

HH. The intercostal muscles.

II. The muscles which bring forward the skin of the back upon the neck to form the hood. They arise from the ribs, and are inserted into the skin.

KK. Muscles which raise the ribs: they originate from that part of the rib near the spine, pass over two ribs, and are inserted into the rib below near its extremity.

LL. Muscles which raise the ribs; arising from one rib and passing over the next, to be inserted into the rib below.

MM. The intercostal muscles.

Fig. 5. A front view of the neck. The parts are dissected to shew the mode in which the ribs lie in their depressed state; also the muscles by which they are depresssed, and those which bring the skin back into its natural state.

AA. The two portions of the lower jaw separated from each other, and turned aside.

BB. The poison fangs.

CCC. The ribs in their depressed state lying over each other on the side of the spine.

DDD. The ribs on the opposite side in their extended state: their extremities become the boundary of the hood, and give it an oval form.

EE. A pair of muscles which bring the head forward upon the neck.

FF. The intercostal muscles.

GG. The muscles which bring the ribs downwards upon the spine.

HH. The muscles which bring the skin backwards from the neck: they have their origin from the points of the ribs, and are inserted into the lower edge of the abdominal scuta.

II. The abdominal scuta divided in the middle line of the belly.

KK. The muscles which go from the lower edge of one scutum to the lower edge of the scutum over it, to bring the scuta closer together, and make them overlap.

LL. An internal view of the skin of the snake beyond the abdominal scuta.

No. II.

Observations on the Orifices found in certain Poisonous Snakes, situated between the Nostril and the Eye. By PATRICK RUSSELL, *M. D. F. R. S. With some Remarks on the Structure of those Orifices, and the Description of a Bag connected with the Eye, met with in the same Snakes. By* EVERARD HOME, *Esq. F. R. S.*

Read before the ROYAL SOCIETY, February 2, 1804.

IN the description of the *Fer-de-lance*, or yellow snake of Martinico, the Count de la CEPEDE has remarked an orifice on each side of the head, between the nostril and the eye, which had by some naturalists been conceived to be the external organ of hearing; but not having an opportunity himself to ascertain the fact by dissection, he recommends it as an interesting object for future investigation.*

* Hist. Nat. tom. ii. p. 122.

I have, in the course of the last three years, received two Colubers from Java; and, by favour of Dr. CLARK, two from Martinico; all four venomous, and distinguished by lateral orifices. In the month of January, 1803, Dr. GARTHSHORE presented me with a specimen of the yellow snake of Martinico in excellent preservation.

Six subjects, distinguished by these lateral orifices now in my possession, offering a fair opportunity to determine a curious circumstance in comparative anatomy, the specimens were submitted to my friend Mr. HOME, of whose assistance I had more than once availed myself in similar investigations. My request was once more attended to; and the subjoined Description and Remarks were received in return.

Among the specimens submitted to Mr. HOME, was one of the *Bodroo Pam*, in the description of which, lately published,* I have misrepresented the orifices now in question as the nostrils, having intirely overlooked the real nostrils.

While the anatomical disquisitions were going on, inspection was made into some of the numerous collections of serpents preserved in the Museums in London. In the British Museum I was shewn, exclusive of the Rattle-snake and the Fer-de-lance, four or five Colubers,† with lateral orifices; in the LEVERIAN Museum I found two or three; in the HUNTERIAN Museum, two Colubers,‡ and three Boæ;§ and in that of Mr. HEAVISIDE, one Coluber.‖

The total found in the Museums above-mentioned, (exclusive of the Rattle-snake,) were ten or eleven Colubers, and three Boæ; which, added to five Colubers in my own possession, amount to eighteen or nineteen subjects furnished with lateral orifices.

It appears on the whole, that the lateral orifices have hitherto been found only in venomous serpents.

That (exclusive of the Rattle-snake), they have been found in fifteen or sixteen species of Colubers, and in three of the Genus Boa.

That they have not as yet been discovered in any of the Genus Anguis.

Mr. HOME'S investigations have clearly established that these lateral orifices in serpents, and the bags to which they lead, have no communication with the organ of hearing. Another fact ascertained by him is, that serpents distinguished by lateral orifices, have a cavity situated between the bag and the eye, which, so far as I know, has not been observed before.

MR. HOME'S DESCRIPTION AND REMARKS.

THE orifices situated between the eye and the nostril in the Rattle-snake, and in some species of Coluber, do not lead to the nostril or to the ear, but to a distinct bag of a rounded form; there is a hollow of the same shape surrounded by bone, and adapted to receive it. Dr. TYSON'S description of the Rattle-snake is tolerably accurate: he says, "between the nostrils and the eyes, but somewhat lower, were two orifices which "I took for the ears, but after, I found they only led into a bone that had a pretty large cavity, but no "perforation."¶

The cavity which Dr. TYSON describes to be in the bone, is a cup, formed by the bones of the skull and those of the upper jaw; it is in shape not unlike the orbit, and is formed in a similar manner.

These bags bear a relative proportion to the size of the snake; they are lined, as also the eyelids, with a cuticle which forms the transparent cornea, making a part of the outer cuticle, and is shed with it; and, when examined after the snake has cast it off, their shape is more perfectly seen than under any other circumstances.

In the annexed figures one of these bags is represented in different views; all of them of the natural size, both in the *Fer-de-lance* or yellow snake of Martinico, and in the detached cuticle of the Rattle-snake. The appearance in the *Bodroo Pam* is exactly the same; but, as the bag in that snake is of a smaller size, it was considered unnecessary to give a representation of it.

In the deer and antelope there are bags, in the same relative situation repecting the eye and the nose,

* Account of Indian Serpents collected on the Coast of Coromandel, No. IX. † All I believe Nondescripts.
‡ No. 977, 1058. § No. 893, 1016, 1046. ‖ No. 64. ¶ Philos. Trans. vol. xiii. p. 26.

resting upon the skull; there is also a cavity in the bone adapted to receive them. The bags vary in size in the different species of these genera. The French naturalists have given the name of *larmiers* to these bags, conceiving them to be receptacles for the tears, of which the thinner parts evaporating, a substance remains called *larmes de cerf.*

I requested my friend Mr. ANDRE to examine these bags in the common buck, and to observe their relative position to the puncta lachrymalia; his situation in the Earl of EGREMONT's family at Petworth affording him every opportunity for doing it. He informs me that the bags are lined with a cuticle similar to that of the meatus auditorius externus in the human ear; their internal surface is smooth, free from hair, and without any appearance of glandular structure. From the inner angle of the eye to this bag, there is a kind of gutter in the skin, of a darker colour than the rest of the skin in light coloured animals, and the hairs are shorter than on the rest of the body: the substance contained in the bags resembled that found in the ears.

The lachrymal gland in the deer, he says, is very large, and the puncta so much so, as to admit the rounded end of a common probe. There is no lachrymal sac; the tubes from the puncta unite and pass through a small opening in the bone to the nose.

The following account of these bags, in the Antelope of Sumatra, was transmitted to me in the year 1792, by Mr. BELL. "The external orifice is of the size of a crow quill; it leads into a bag not larger than a "small marble, which is lined with a cuticle with hair. From this bag there is a secretion of a limpid fluid, "which keeps oozing down the nose." This gentleman, unfortunately for Natural History, died at Sumatra soon after the date of his letter.

In the HUNTERIAN Museum, intrusted by Government to the care of the College of Surgeons, there are several specimens of these bags from the Egyptian Antelope, with annulated horns, and also from some other species; these are preserved so as to shew the internal cavity of the bag, and the structure of the gland immediately behind it. In these specimens the glandular part is one-fourth of an inch in thickness; from the centre of this gland, an excretory duct opens into the bag immediately opposite to the external orifice. The bag itself is lined with a cuticle, and thinly set with strong hairs.

The facts now produced are sufficient to prove that these bags have a secretion of their own, the quantity of which varies according to the climate and other circumstances; and there is no reason for thinking that the tears ever pass into them, the passage into the nose being unusually free, and the orifices in the bags in many species unfavourably situated for the reception of the tears.

We are at present unacquainted with the use to which the fluid secreted in these bags is applied.

As amphibious animals, in general, have no glands to supply the skin with moisture from within, but receive it by coming in contact with moist substances, it is possible the bags in the snake may be supplied in that manner, and the more so, as the cuticular lining appears perfect.

Another peculiarity is remarkable in snakes furnished with the bags described above, namely, an oval cavity situated between the bag and the eye, the opening into which is within the inner angle of the eyelid, and directed towards the cornea. In this opening there are two rows of projections which appear to form an orifice capable of dilatation and contraction. From the situation of these oval cavities, they must be considered as reservoirs for a fluid, which is occasionally to be spread over the cornea; and they may be filled by the falling of the dew, or the moisture shaken off from the grass through which the snake passes.

This apparatus in the snake has that position which is best adapted to pour out the fluid upon the cornea, when the head of the snake is erect.

Dr. TYSON had superficially observed the apparatus which has been described, and considered it as a membrana nictitans. He says, "inwards it seemed to have a membrana nictitans, which removes any dust "that might adhere to the eye."*

* Phil. Trans. vol. xiii. p. 27.

As Snakes in general have no apparatus to wash the cornea, these particular species must have some peculiarities in their mode of life, with which we are not at present acquainted.

EXPLANATION OF THE FIGURES.

PLATE III.

Fig. 1. Represents a side view of the head of the *Fer de lance*, or Yellow Snake of Martinico, to shew the external appearance of the orifice with its relative situation to the nostril and the eye. The parts are delineated of their natural size.

Fig. 2. A side view of the head of the same Snake, in which the bag is laid open. At the aperture of the cavity, which opens towards the cornea, there is a double row of small projecting points.

Fig. 3. The cuticle of the Rattle-Snake, after it had been cast off from one side of the head, represented of its natural dimensions. In this view the internal surface only of the cuticle is seen. There is an aperture of an irregularly oval form, which is the opening of the nostril: a little farther on is the lining of the rounded bag, in a distended state; nearer the eye is the cavity communicating with the space before the cornea, it is of an oval form, and has a narrow neck; beyond this neck is the transparent cornea, which in the Snake is cuticular, and is shed with the external covering of the other parts. Through the transparent cornea a bristle is seen passing before its external surface into the cavity.

This figure is taken from a preparation in the HUNTERIAN MUSEUM.

No. III.

Extract from MR. HOME'S *Account of the Case of a Man who died by the Bite of a Rattle-Snake.*

Read before the ROYAL SOCIETY, December 21, 1809.

THE following cases were sent from India, to my late friend Dr. PATRICK RUSSELL: they arrived after his death, and Mr. CLAUD RUSSELL very kindly gave them to me, knowing the subject of them to be one, in which I had taken an interest.

A boy, a slave of a gentleman in India, was bitten by a snake called Kamnlee by the natives, in the lower part of the arm, at eight o'clock in the evening. The blood flowed very freely for some time. He died next day at noon in great pain.

A sepoy, 60 years of age, was admitted into the hospital of his regiment, under the care of Mr. PERRIN, assistant surgeon, at four o'clock in the afternoon of the 15th of October, 1802, in consequence of his being bitten by a Cobra di Capello, on the back part of the hand. At the time of his admission he complained of pain running up the arm. He immediately took a drachm of eau de luce, and this dose was repeated every half hour, and the same remedy was applied externally as a lotion to the arm and forearm. At four o'clock in the morning of the 16th of October, the pain began to increase, and the arm to swell with great hardness and stiffness, and tumor in the axilla, with much inclination to vomit. He took twelve grains of Dr. JAMES's powder, which brought up a great quantity of bilious matter. He drank copiously of warm water, but no perspiration was induced. He appeared relieved for a short time. At eight o'clock in the morning the arm

was distended, painful, and discoloured. He took four ounces of brandy, and repeated it every hour until twelve o'clock, with a drachm of eau de luce occasionally. At this time he was a little revived. The brandy was reduced to two ounces, which were carefully and regularly given every hour, until twelve at noon on the 17th of October, when the arm was more free from pain, but much swelled, hard, and black: his spirits and pulse also were considerably relieved. The eau de luce was now omitted, but the brandy was continued every hour, until twelve o'clock at noon on the 18th of October, when the stiffness and tumor in the axilla had disappeared: the arm was still swelled, but was softer, and less painful. The brandy was omitted: at night he took six grains of Dr. JAMES's powder. On the 19th of October the arm was less, softer, with little or no pain; a blister was formed and burst on the back of the hand, which discharged three ounces of black fœtid pus. On the 20th, an abscess burst on the hand, in the same situation as the blister, which discharged a large quantity of a fluid having an offensive smell. He was directed to take a drachm of Peruvian bark in port wine, every two hours. On the 22d the swelling was gone, but the discharge was considerable. From this time the man gradually, but slowly recovered, with the loss of the use of his forefinger, which remained permanently extended, and some of the other fingers were affected in a less degree.

In this case, the swelling of the arm was slower in coming on, and less extensive; the pain running up to the axilla, which preceded it, was mistaken for the effect of absorption.

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	Squam. subc. -		42			
XXXV.	Scut. abd. -		144	Tail broken. Java.		Not ven.
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XXXVI.	Scut. abd. -		186	250. Java.		Ven.
Coluber Naja,	Squam. subc. -		64			
XXXVII.	Scut. abd. -		194	260. Java.		Not ven.
	Squam. subc. -		66			
XXXVIII.	Scut. abd. -		170	222. Java.		Not ven.
	Squam. subc. -		52			
XXXIX.	Scut. abd. -		202	270. India.		Not ven.
	Squam. subc. -		68			
XL.	Scut. abd. -		151	197. India.		Not ven.
	Squam. subc. -		46			
XLI.	Scut. abd.	217 293	215	293. Java.		Not ven.
	Squam. subc.	76	78			
XLII.	Scut. abd. -		238	333. Java.		Not ven.
	Squam. subc. -		95			

ANGUIS.

PART I. COAST OF COROMANDEL.

XLI.	Nalla Wahlagillee Pam,	Squam. abd. -			Vizagapatam.	Not ven.	47
		Squam. subcaud. -					
XLII.	Rondoo Talooloo Pam,	Squam. abd. -	151	271.	-	Not ven.	48
		Squam. subc. -	120				
XLIII.	Rondoo Talooloo Pam,	- -	-		Vizagapatam.	Not ven.	48
XLIV.	Tatta Pam, Anguis Scytale, Linn. Syst. Nat. p. 392.	-	-		Vizagapatam.	Not ven.	49

PART II. CONTINUATION OF INDIAN SERPENTS.

VI.	Kerril Pattee,	Squam. abd. -	323	369.	The Sunderbunds.	Ven.	7
		Squam. subcaud. -	46				
VII.	Shootur Sun, -	Squam. abd. -	332	372.	The Sunderbunds.	Ven.	8
		Squam. subc. -	40				
VIII.	Kalla Shootur Sun,	Squam. abd. -	338	386.	The Sunderbunds.	Ven.	9
		Squam. subc. -	48				
IX.	Chittul, -	Squam. abd. -	308	356.	The Sunderbunds.	Ven.	10
		Squam. subc. -	48				
X.	Hoogli Pattee, -	Squam. abd. -	306	358.	The Sunderbunds.	Ven.	11
		Squam. subc. -	52				
XI.	Valakadyen, -	Squam. abd. -	318	363.	Tranquebar.	Not ven.	13
		Squam. subc. -	45				
XII.	Shiddil, -	Squam. abd. -	228	266.	-	Not ven.	14
		Squam. subc. -	38				
XIII.	Kadell Nagam, -	Squam. abd. -	278	316.	-	Not ven.	15
		Squam. subc. -	38				
XXVII.	- - -	Squ. abd.	206	214.	Java.	Not ven.	31
	Anguis Scytale, Linn. Syst. Nat. p. 923.	Squ. subc.	8				
XXVIII.	Shilay Pamboo, -	Squam. abd. -	207	213.	Tranquebar.	Not ven.	32
		Squam. subc. -	6				
XXIX.	- - -	Squam. abd. -	194	200.	India.	Not ven.	33
	Anguis Maculata, Linn. Syst. Nat. p. 391.	Sq. subc.	6				

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